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Timber Management
Environmental Impact Statement

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Timber Management
Environmental Impact Statement

Oregon State Office

March 3, 1849

IN REPLY REFER TO
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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
District Office
1717 Fabry Road S.E.
P. O. Box 3227
Salem, Oregon 97302

Enclosed for your review and comment is the Eastside Salem Timber Management Draft Environmental Impact Statement (DEIS). The statement analyzes the impacts which would result from the proposed timber management plan and seven alternatives. The purpose of the statement is to disclose the probable environmental impacts and to assure that these impacts are considered along with economic, technical and other considerations in the decisionmaking process.

Comments concerning the adequacy of this statement will be considered in the preparation of the final environmental impact statement. The comment period will end March 23, 1982. Informal discussion sessions intended to assist you in reviewing and commenting on the DEIS will be held at 1:00 P.M. and 7:00 P.M., March 2, 1982, at the Bureau of Land Management District Office, 1717 Fabry Road S.E., in Salem, Oregon. Bureau of Land Management personnel will be available at both sessions to answer questions regarding the DEIS analysis.

This draft may be incorporated into the final EIS by reference only. The final EIS then would consist of public comments and responses and any needed changes of the draft. Therefore, please retain this draft EIS for use with the final.

Comments received after the close of the comment period will be considered in the decision process, even though they may be too late to be specifically addressed in the final environmental impact statement.

Your comments on the EIS should be sent to the Salem District Manager. Please address all comments to:

Salem District Manager
Attention EIS Team Leader
Bureau of Land Management
P. O. Box 3227
Salem, Oregon 97302

In using this analysis, readers should keep in mind that an EIS (draft or final) is not the decision document. Final decisions will be made after the close of the final EIS comment period. The decision process will differ from the one described in our booklet, "Making Land-Use Decisions - BLM Needs Your Help". While that process will be followed in reaching decisions for the Westside Salem timber management plan, we have concluded, that a two-step decision process would unnecessarily prolong the decision for the east half of the Salem District. We believe that public comment on the draft and final Eastside Salem EIS can provide adequate opportunity for the public to address the prospective decisions.

Consideration will be given to changing the preferred alternative in the final EIS if public comments on the draft EIS or other events indicate a need to do so.

Comments on both draft and final EIS will be used to reach a final decision. There will be no draft decision document issued for public comment. The final decision will be announced through release of a decision document to interested parties.

One of the issues raised during scoping was preparation of benefit/cost analysis for the proposed action and alternatives. Procedures for this analysis, which will be applied uniformly in all western Oregon districts, are being developed. The analysis for the Eastside Salem Sustained Yield Units will be prepared as soon as procedures are established and should be available by the time this EIS reaches you. If you are interested in the results, please notify the Salem District EIS Team Leader.

Thank you for your continuing interest in this project.

Sincerely,

Joseph Dose

District Manager

DEPARTMENT OF THE INTERIOR

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

EASTSIDE SALEM SUSTAINED YIELD UNITS
TEN-YEAR TIMBER MANAGEMENT PLAN

Prepared by

BUREAU OF LAND MANAGEMENT

DEPARTMENT OF THE INTERIOR

State Director, Oregon State Office

EASTSIDE SALEM PROPOSED TIMBER MANAGEMENT

Draft (x) Final ( ) Environmental Impact Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ( )

2. Abstract: This EIS describes and analyzes the environmental impacts of implementing an updated 10-year (1983-1992) timber management plan for the 159,898 acres of public land in the Clackamas-Molalla and Santiam Sustained Yield Units on the eastside of the Salem District, Oregon. The Bureau of Land Management is responsible for managing timber on public lands under the principle of sustained yield consistent with the protection of other resources. Eight alternatives including a proposed action are described and analyzed for environmental impacts. The proposed action, the result of Bureau multiple use planning using public input, is the preferred alternative. Other alternatives analyzed include: 1) maximum timber production, 2) emphasis on timber production, 3) moderate emphasis on timber production, 4) strong emphasis on non-timber values, 5) accelerated timber harvest, 6) no control of competing vegetation with herbicides and 7) no action. Specific timber management components of the proposed action and alternatives include road construction, timber harvest, site preparation, reforestation, plantation protection, precommercial thinning, fertilization and control of competing vegetation. Significant environmental impacts of the proposed action include wildlife habitat modification, soil productivity loss, sediment reduction and natural area degradation.

3. The draft statement is expected to be filed with the Environmental Protection Agency (EPA) and made available to the public on January 22, 1982. The comment period will be 60 days following transmittal to EPA.

4. For further information contact:

Bob Saunders, Team Leader
Bureau of Land Management
Salem District Office
P. O. Box 3227
Salem, Oregon 97302
Telephone (503) 399-5634

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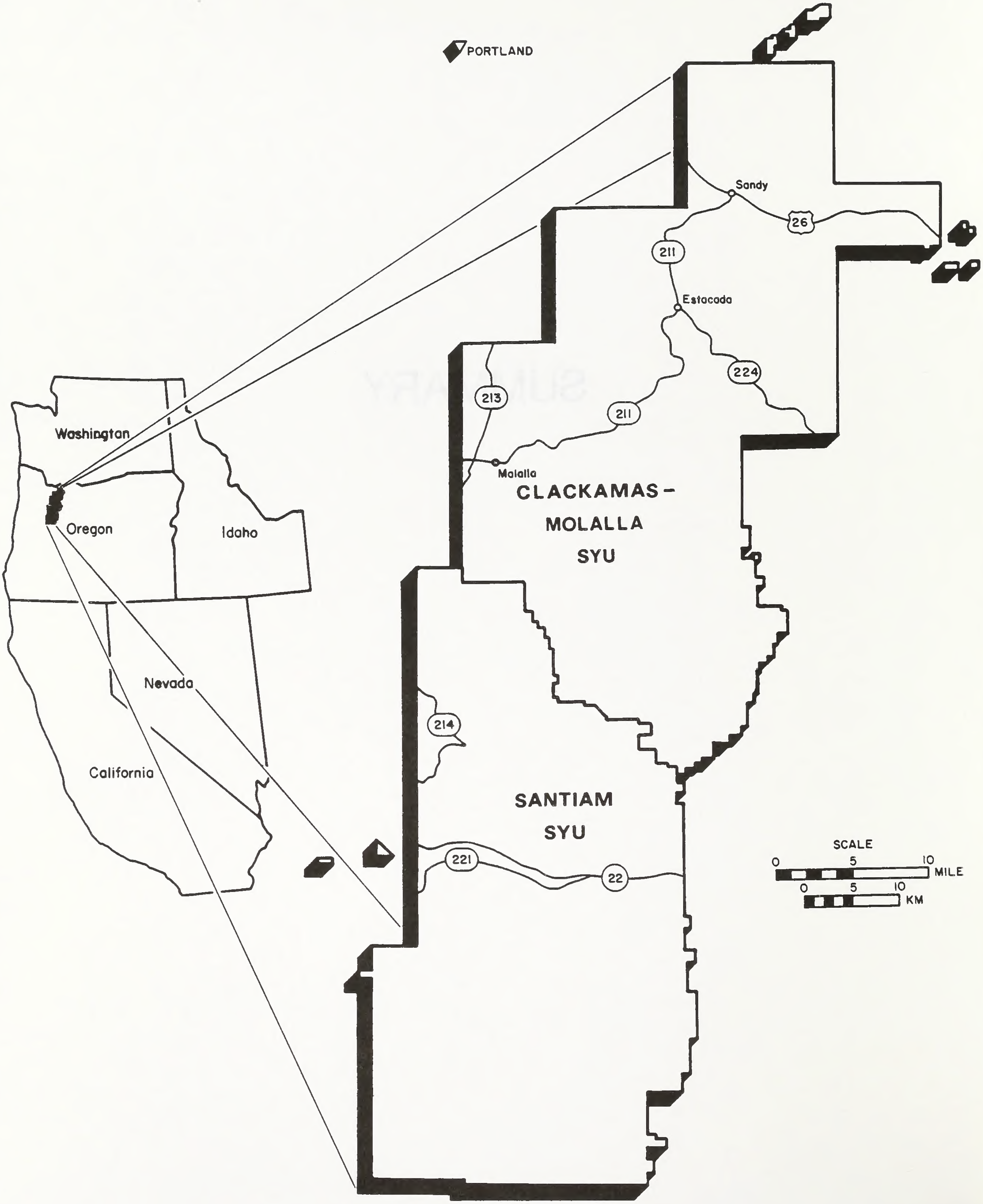
SUMMARY

VICINITY MAP
EASTSIDE SALEM SYUS



SUMMARY

Introduction

This environmental impact statement (EIS) describes and analyzes the environmental impacts of implementing an updated 10-year (1983-1992) timber management plan for the Clackamas-Molalla and Santiam Sustained Yield Units in the Salem District, Oregon. Hereafter, the Sustained Yield Units will be referred to as Eastside Salem Sustained Yield Units or simply the SYUs. This EIS applies to actions proposed for the 159,898 BLM-administered acres within the combined SYUs. These are primarily revested Oregon and California Railroad lands.

In accordance with the National Environmental Policy Act, this EIS identifies impacts on the natural and human environment associated with the proposed action and alternatives. The EIS analysis is based primarily on data collected and analyzed through the Bureau planning system which included extensive public involvement. A preferred land use alternative, selected during the planning process, provides the basis for the EIS proposed action. Seven other alternatives have been identified, providing a wide range of options for review and consideration.

Alternatives Including the Proposed Action

Timber harvest under all alternatives would be accomplished predominately by clearcutting, with some single tree selection. Intensive timber management treatments would include construction of logging roads, brush field and hardwood stand conversion, site preparation with burning, mechanical means and herbicide application (except Alternative 6), planting coniferous trees (including genetically improved stock), animal damage control, plantation maintenance and release with herbicides or manual means, precommercial thinning and fertilization. All of these treatments except for herbicide application would be used under Alternative 6.

Variables among alternatives include amounts of land allocated to timber production, types and amounts of intensive management practices, harvest scheduling and constraints on timber harvest to benefit other resource values. The proposed action and alternatives are:

Proposed Action (Preferred Alternative). This alternative would result in an average annual timber harvest of 90.9 million board feet (MM bd. ft.). Protection of riparian zones to benefit water quality, fish and wildlife would be provided. Designated areas would be managed to produce and maintain large and small blocks of old-growth and mature forest habitat. These areas would be distributed in corridors. Partial protection of special wildlife habitat is also included in this alternative. Areas with highly scenic, recreational and critical environmental values would be protected through preservation or special management techniques.

1. Maximum Timber Production. This alternative would produce an average annual timber harvest of 118.4 MM bd. ft. Except for protection of existing recreation and progeny test sites, all commercial forest land would be allocated to intensive timber production. This alternative would provide streamside buffers consistent with the Oregon Forest Practices Act; however, protection for riparian zones, mature and old-growth forest, scenic areas, natural areas, fragile soils and similar resource values would not be provided.

2. Emphasis on Timber Production. This alternative represents perpetuation of current management constraints with the addition of more intensive application of forest management treatments. An average annual timber harvest of 93.1 MM bd. ft. could be sustained. Non-timber provisions include retention of old-growth and mature forest in spotted owl management areas and some protection of riparian zones, visual resources, recreation sites and natural areas by avoiding and/or constraining on-site timber management activities. Use of formal protective designations, such as Research Natural Area, would be minimal.

3. Moderate Emphasis on Timber Production. Average annual harvest under this alternative would be 91.9 MM bd. ft. Allocations for riparian zone and recreation site protection would be similar to Alternative 2. Major differences from Alternative 2 would be greater protection of Areas of Critical Environmental Concern (ACECs) and allocation of more acres for old-growth and mature forest wildlife habitat, visual resources and designated Research Natural Areas.

4. Strong Emphasis on Wildlife and Other Non-Timber Values. Under this alternative, average annual timber harvest would be 64.2 MM bd. ft. A full ecosystem approach would be used to provide wildlife habitat diversity. Designated areas would be managed to produce and maintain large and small blocks of old-growth and mature forest habitat. These areas would be distributed over the entire SYUs rather than confined to corridors as in the proposed action. Other high value, non-timber resources would be protected through preservation and formal protective designations.

5. Accelerate Timber Harvest. This alternative uses the same land allocations as the proposed action but increases the average annual harvest by departing from even-flow harvest levels for three decades in one SYU and by lowering the minimum age for final harvest in the other SYU. These modifications would produce annual harvests of 99.1 MM bd. ft. in the first decade, 92.0 MM bd. ft. in decades two and three and 93.0 MM bd. ft. in decade four and beyond.

6. No Control of Competing Vegetation with Herbicides. This alternative is the same as the proposed action except that herbicides would not be used to control grass, brush and hardwood species growing in competition with commercial conifers. Control of vegetation for timber management by burning, grazing or using mechanical or manual means would be prescribed to the same dollar level of investment as used for herbicides in the proposed action. This would result in an average annual timber harvest of 85.8 MM bd. ft.

7. No Action (No Change). This alternative constitutes a continuation of the present allowable cut (86.1 MM bd. ft.). Continuation of the same management practices and constraints used in the 1972 allowable cut calculation is assumed. Minimal protection would be provided for developed recreation sites, wildlife habitat and the most sensitive scenic areas.

Environmental Consequences

Air Quality

Slash burning for the decade ranges from 7,707 acres under Alternative 4 to 15,259 acres under Alternative 1. Air quality in nearby residential areas could be impacted by relatively brief smoke intrusions under any alternative. Past experience indicates that smoke intrusions in residential areas are not likely to occur from BLM slash fires in the SYUs.

Soils

Road construction, yarding, slash burning and brush scarification can create soil compaction, soil disturbance, soil loss and mass failures. The severity of any impact is closely related to fragility of soils and amount of area disturbed. Where soils are highly impacted, vegetation productivity would decline. Acres lost from production (by compaction and topsoil removal, dry ravelling, debris avalanches and debris torrents) are expected to range from 2,006 under Alternative 1 to 1,158 under Alternative 4.

Water Resources

Road building and soil compaction from logging would locally increase runoff and streamflows. Water yield increases would be negligible in the SYUs as a whole.

Cumulative sediments produced as a result of activities under the proposed action and all alternatives except 1 would be expected to decrease from existing levels. Sediment yield for Alternative 1 would increase 2.9 percent above existing levels. Sediment yield would decrease as much as 10.2 percent below existing levels under Alternative 4. The amount of sediment produced would depend on factors such as proximity of disturbance to waterways, streamside buffer widths, percent slope, climatic events and soil erodibility.

Vegetation

Alterations to plant community structure and longevity would be the most significant impacts to vegetation on lands scheduled for timber harvest. Acres scheduled for timber harvest would range from 10,822 under Alternative 4 to 20,617 under Alternative 1. Mature and old-growth forest communities would be converted to early successional stage communities as slow-growing timber stands are replaced by young, fast-growing stands. Diversity and complexity of plant communities would diminish as maximum growth of commercial conifers is emphasized. Changes in plant communities and habitat could eliminate some plant species. Permanent road construction during the decade would eliminate some vegetation from public land, ranging from 685 acres under Alternative 4 to 1,197 acres under Alternative 7.

Animals

Of all alternatives, Alternative 1 would most impact habitat diversity by reducing amounts of old growth and mature forest to 29,717 acres (decade 1). Alternative 4 would have the least impact, retaining 35,295 acres of old growth and mature forest. Habitat removed by road construction would be permanently and irretrievably lost for roads constructed as part of the permanent road system. Elk use of habitat within one-half mile of these roads would probably be reduced.

Under most alternatives, cold water fish habitat is expected to continue improving except where design features (e.g., relating to roads, bridges, culverts) fail. If Alternative 1 were selected, impacts to fisheries would be significant and adverse.

Increases in water yield could have an adverse impact on fish in small watersheds, but impacts would be negligible to the fishery resource in the SYUs as a whole. Local changes in water temperature would be expected under all alternatives. Adverse impacts resulting from temperature changes would be greatest under Alternatives 1 and 7.

The spotted owl is listed by the State of Oregon as a threatened species. The proposed action and all alternatives would reduce the number of existing spotted owl locations in the SYUs. During the first decade, protected spotted owl locations would range from 10 under the proposed action and Alternatives 3, 5 and 6 to 0 under Alternative 1 (based on an assumption that 300+900 acres/location is adequate protection).

Recreation

Depending on the recreation experience desired, impacts from timber management would be both beneficial and adverse. The greatest adverse impacts on recreation would occur under Alternative 1, which would nominally provide for future needs and would severely degrade the recreation experiences desired by most visitors. Alternative 4 would most benefit recreation, since dispersed and developed recreation needs would be fully accommodated. Under the proposed action and Alternatives 3, 5 and 6, many future needs would be accommodated, but adverse impacts would still occur. Some needs for developed recreation sites would not be accommodated, some established buffers and trails would be impacted, and a few higher quality recreation use areas would be only partially protected. Alternatives 2 and 7 would accommodate fewer future recreation needs, creating low to moderate adverse impacts.

Cultural Resources

Appropriate measures would be taken to identify and protect cultural sites prior to ground-disturbing activities under the proposed action and all alternatives. Undiscovered cultural sites would be susceptible to considerable alteration and damage. Once a site is found, however, measures would be taken to minimize or avoid damage.

Under the proposed action and Alternatives 2 through 6, known sites and sites discovered before logging would be managed to protect scientific and/or interpretive values. Under Alternatives 1 and 7, only sites (except Table Rock Trail) on or eligible for the National Register of Historic Places would be protected from ground disturbance. (Table Rock Trail would be subject to impact at one point by a road crossing.) Appropriate measures utilizing known strategies for data recovery would be developed for all other cultural sites; however, some loss of information may result from not protecting sites until new methods for recovery and analysis are formulated.

Visual Resources

Alternative 4 provides the highest degree of protection for visual resources. Adverse visual impacts under Alternative 3 would be low, with most highly scenic and/or sensitive areas protected. Under the proposed action and Alternatives 5 and 6, adverse visual impacts would be moderate, and some protection would be provided for certain highly scenic and/or sensitive areas. Adverse visual impacts would be greatest under Alternatives 1, 2 and 7.

Areas of Critical Environmental Concern (ACEC)

Seven areas identified as potential ACECs would not be impacted by timber management under Alternative 4. The proposed action and Alternatives 3, 5 and 6 would allow restricted timber management in buffer zones of several potential ACECs, but primary zones would be protected. Some primary zones would be indirectly impacted under Alternatives 2 and 7. All potential ACECs would be subject to timber management and loss of critical values under Alternative 1.

Human Health

Use of herbicides in forest management is perceived by some as hazardous to human health. Based on current knowledge and the low risk of exposure on BLM-treated acres, an unreasonable risk to human health from continued, careful use of herbicides is unlikely. Over the decade, treatments with herbicides would vary from 6,664 acres under Alternative 1 to 3,280 acres under Alternative 4. Herbicides would not be used under Alternative 6.

Energy Use

Fossil fuel energy would be consumed in all phases of the 10-year timber management plan. The annual energy consumption would range from .331 trillion British thermal units (Btu's) under Alternative 4 to .582 trillion Btu's under Alternative 1. The annual energy consumption attributable to the proposed action would be approximately .456 trillion Btu's.

Socioeconomics

Compared to recent economic conditions, the proposed action and all alternatives except 4 would increase employment in the timber industry and total local employment and earnings. The proposed action would result in an increase of 319 jobs and $4.3 million in annual earnings. Alternative 1 would cause the largest increases of 1,127 jobs and $15.4 million in earnings. Alternative 4 would cause the loss of 698 jobs and $9.4 million in earnings. Comparing O&C payments with amounts which would be payable from 1976-78 harvest levels valued at fiscal 1980 timber sale prices, the portion of O&C payments to counties from the SYUs would be increased for the proposed action (by $1.3 million) and for all other alternatives except 4. Alternative 4 would cause a decrease of $3.0 million. This loss would be equivalent to a reduction of 0.3 percent of total property tax levies for O&C counties.

Compared to a continuation of the current timber management program, all alternatives except 4 would have a favorable impact on total employment and earnings. Under the proposed action, employment would be increased by 169 jobs and earnings by $2.2 million. The largest increases would occur under Alternative 1 with net increases of 978 jobs and $13.3 million in earnings. Alternative 4 would result in the loss of 848 jobs and $11.5 million in earnings. O&C payments from the SYUs would be increased under the proposed action and all alternatives except 4 and 6. Under Alternative 4, O&C payments to counties would be reduced by $3.7 million, or 0.4 percent of total levies.

CHAPTER 1

DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

CHAPTER 1 DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

PURPOSE OF AND NEED FOR THE ACTION

The Bureau of Land Management (BLM) proposes to implement, beginning October 1, 1983, an updated 10-year timber management plan for the Clackamas-Molalla and Santiam Sustained Yield Units (see Glossary) in the Salem District, Oregon (see Figure 1-1, folded maps in back cover pocket). Hereafter, the Sustained Yield Units will generally be referred to as the Eastside Salem SYUs or simply the SYUs. In accordance with the National Environmental Policy Act (NEPA), this Environmental Impact Statement (EIS) identifies impacts on the natural and human environment associated with the proposed action and seven alternatives. The 10-year timber management plan for the SYUs will provide direction for management of BLM-administered land, as required by the actions described in this chapter.

The major BLM-administered holdings in the SYUs are revested Oregon and California Railroad lands (O&C lands). The Bureau's principal authority and direction to manage the O&C lands is found in the O&C Act of 1937 (50 stat. 874; 43 U.S.C. 1181a., et seq.). Under this Act, O&C lands classified as timberlands are to be managed under sustained yield principles in order to provide a permanent source of timber supply, watershed protection, streamflow regulation and recreation facilities. Most of the remaining BLM-administered land is intermingled public domain, which was brought under sustained yield management principles by the Bureau's 1969 application to withdraw these lands from entry under all public land laws except certain disposal acts. Withdrawal was completed by Public Land Order 5490 (40 FR 7450 (1975)). In addition, many activities of the BLM are governed by the Federal Land Policy and Management Act of 1976 (90 Stat. 2743, 43 U.S.C. 1701). This law, often referred to as FLPMA, established policy for BLM administration of public lands under its jurisdiction.

The legal requirements for the management of the O&C lands are the subject of an opinion of the Solicitor dated September 8, 1981. A copy of this opinion and the associated Policy Statement of the BLM are included in this EIS as Appendix A.

The 10-year timber management plan will be based upon a comprehensive land use plan for the SYUs prepared by Salem District personnel. Comprehensive planning covers 159,898 acres administered by BLM. These lands are widely dispersed over portions of Clackamas, Linn, Marion and Multnomah Counties, an aggregate area of 3,726,000 acres (Table 1-1).

Appendix B presents a discussion of the planning process and inventory methods used to arrive at the timber production base (see Glossary), allowable cut determination and other land use allocations. Acreages for land use allocations by alternative are shown in Table B-2.

Table 1-1 Acres in EIS Area[1], by County

County	O&C[2]	PD[3]	Other BLM[4]	Total BLM	Total County
Clackamas	49,990	13,158	80	63,228	1,211,520
Linn	68,501	2,724	7	71,232	1,470,000
Marion	20,786	219	64	21,069	752,000
Multnomah	3,421	948	--	4,369	292,480
Total	142,698	17,049	151	159,898	3,726,000

[1] Acreage figures for BLM-administered lands are derived from master title plats. Total acreage figures are from Resource Atlases published by Oregon State University Extension Service, 1964.

[2] Oregon & California Railroad Lands.

[3] Public Domain Lands.

[4] Railroad Grant and Acquired Lands.

During the planning process, decision criteria were used to evaluate allocation alternatives and select a preferred alternative. Each alternative was evaluated according to the degree to which it would:

- Maintain or increase sustained yield timber production to meet regional and national needs.
- Minimize soil loss caused by management activities (including road construction) and uncontrolled activities (e.g., off-road vehicle use).
- Contribute to the improvement or maintenance of water quality in streams, rivers and municipal watersheds, compared to current conditions.
- Minimize impacts on air quality in residential areas.
- Meet demands for developed and dispersed recreation opportunities on BLM-administered land.
- Maintain the visual quality of the forest landscape in areas of high scenic value and/or high sensitivity.
- Protect, improve and develop fish spawning, rearing and migration habitat.
- Protect important wildlife habitat.
- Protect or enhance habitat of threatened or endangered plant and animal species.

- Provide for Research Natural Areas and similar areas for scientific and educational study.
- Protect significant archeological and historic sites.
- Maintain or increase local employment and personal earnings dependent on each resource program administered by the Salem District.
- Maintain or increase contributions to local public revenues derived from each resource program administered by the Salem District.
- Demonstrate consistency with State planning goals (Land Conservation and Development Commission) and acknowledged local comprehensive plans.
- Demonstrate consistency with officially approved resource-related plans, programs and policies of other Federal agencies.

The results of this evaluation, combined with public input, produced the preferred land use alternative. The preferred land use alternative provided the basis for development of the proposed action in this EIS. Development of the proposed action does not constitute a final decision (see Implementation section, this chapter).

The alternative land use plans prepared for the SYUs identify various timber harvest levels, management practices and mitigating measures to protect the land and other resources. This information is described in detail in the remainder of this document.

During an EIS scoping meeting held in Salem, Oregon (July 14, 1981), participants were asked to identify issues and alternatives to be addressed in this EIS. The following section includes alternatives identified during scoping and considered appropriate for full analysis. Alternatives identified but not considered appropriate for full analysis, and the rationale for these determinations, are presented in Appendix C, which summarizes the scoping meeting.

PROPOSED ACTION AND ALTERNATIVES

There are eight alternatives including the proposed action (the preferred alternative) for which impacts will be analyzed in Chapter 3:

Proposed Action (PA)

1. Maximum Timber Production (Max. Tbr.)
2. Emphasis on Timber Production (Emp. Tbr.)
3. Moderate Emphasis on Timber Production (Mod. Tbr.)
4. Strong Emphasis on Non-Timber Values (Emp. Other)
5. Accelerate Timber Harvest (Acc. Tbr.)
6. No Control of Competing Vegetation with Herbicides (No Herb.)
7. No Action (No Change)

For each alternative, sustained yield harvest levels (allowable cuts) have been calculated using the timber production bases of the two SYUs. For convenience, the two cut estimates are combined in this EIS. All allowable cut computations are made in cubic feet and converted to Scribner (see Glossary) board feet equivalence for the first decade. Variables between alternatives include amount of land allocated to timber production, types and amounts of intensive management practices, and constraints on timber harvest to accommodate other resource values. These variables are displayed in Table 1-2. Forest management treatments and design elements applicable to each alternative are discussed in the next section of this chapter.

Under the proposed action and Alternatives 2, 3, 4 and 6, the youngest trees available for future final harvest in the intensive timber production base would be 60 years of age. Timber of this age would be harvested during the 10th through 40th decades in the Clackamas-Molalla SYU and the 5th through 12th decades in the Santiam SYU. The average size of this timber would be 15 inches diameter at breast height (dbh). When the forest approaches a regulated condition (see Glossary), the average diameter of timber proposed for final harvest for the combined SYUs would be 17 inches dbh, normally reached in 70 years. As discussed below, the average diameter of timber proposed for final harvest before regulation would differ from 15 inches dbh under Alternatives 1, 5 and 7.

In areas allocated to constrained timber production, harvest limitations would be used to achieve recommended goals for wildlife habitat diversity, visual resource management (VRM), recreation lands (see Glossary) and Areas of Critical Environmental Concern (ACEC) (see Glossary). On lands in the wildlife constrained timber bases, the intent would be to maintain specific acreages in timber at or above 200 years and/or 350 years at any one time during the projection period. No harvesting would be undertaken until minimum acreages were achieved.

Protection of visual and recreation values and potential ACECs would be accommodated by placing limitations on the number of acres harvested from constrained bases during each decade. No attempts were made to restrict harvest to certain age classes.

The harvest level shown in Table 1-2 for each alternative is a composite of the individual intensive and constrained timber production bases. Table 1-3 displays the breakdown by category and alternative.

The Proposed Action

The proposed 10-year timber management plan would provide an average annual harvest of 90.9 million board feet (MM bd. ft.). A time lag of 5 to 7 years before harvest of adjacent clearcut units would be applied when possible.

Riparian zones (see Glossary) on all third order and larger streams and all second order streams with fish and municipal water diversions would be protected by limiting disturbances to road and yarding corridors. Wildlife habitat diversity would be retained in ecosystem management corridors, encompassing forest lands of all ages up to 350 years (see Appendix D). Within the

Table 1-2 Comparison of Proposed Action and Alternatives by Treatment - First Decade

	Proposed Action (PA)	Alt. 1 Max. Tbr	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	Alt. 7 No Action
Intensive Timber Production Base[1]	102,901	141,836	102,288	108,944	70,099	102,901	102,901	120,329
Constrained Timber Production Base[1]	18,696	0	20,805	7,520	43,480	18,696	18,696	9,879
Annual Harvest								
Million bd.ft.	90.9	118.4	93.1	91.9	64.2	99.1	85.8	86.1
Million cu.ft.	14.27	18.59	14.61	14.42	10.08	15.56	13.47	13.52
Treatments[2]								
Transportation System (miles;acres)								
New Construction[3]	96;771	104;828	97;776	93;743	86;685	96;771	96;771	150;1,197
Reconstruction	50;0	50;0	50;0	50;0	50;0	50;0	50;0	50;0
Timber Harvest (acres)								
Clearcut	12,880	17,194	13,424	13,080	9,027	14,118	12,333	13,115
Shelterwood	674	0	0	389	311	674	674	0[7]
Mortality Salvage	1,065	1,322	562	1,063	637	1,065	1,065	1,844
Commercial Thinning	1,488	2,101	1,208	1,682	847	1,488	1,488	1,842
Site Preparation (acres) [4]								
Broadcast Burning (slash disposal)	11,343	15,259	11,835	11,493	7,707	12,480	9,828	10,130
Herbicide	5,050	6,650	5,250	5,000	3,300	5,500	0	3,950
Manual	367	471	399	373	205	391	2,041	234
Mechanical	3,578	4,760	3,765	3,662	2,513	3,910	3,454	3,237
Planting (acres)								
Initial Plant[5]	12,544	15,860	13,124	12,716	8,438	13,782	11,997	11,918
Replant or Interplant	6,900	8,723	7,218	6,994	4,641	7,580	6,598	6,555
Plantation Protection (acres)	4,362	5,799	4,602	4,402	2,825	4,761	4,212	1,864
Plantation Maintenance and Release[6] (acres)	5,553	7,499	5,781	5,667	3,835	6,109	2,199	5,446
Precommercial Thinning (acres)	11,162	13,498	11,623	12,599	8,243	11,162	11,162	13,079
Fertilization (acres)	7,984	9,282	8,064	8,702	6,418	7,984	7,984	0[7]

[1] See Glossary.

[2] Each treatment is described in detail following descriptions of the alternatives.

[3] Figured at the rate of 8 acres/mile of road, including landings.

[4] Includes stand conversion (brush and hardwood) acres: under the PA and Alts. 5 and 6 - 435 acres; Alt. 1 - 322 acres; Alt. 2 - 476 acres, Alt. 3 - 379 acres; Alt. 4 - 96 acres; and Alt. 7 - 0 acres.

[5] Includes acres to be planted with genetically-improved seedlings: under the PA - 10,049 acres; Alt. 1 - 13,234 acres; Alt. 2 - 10,490 acres; Alt. 3 - 10,178 acres; Alt. 4 - 6,888 acres; Alt. 5 - 11,004 acres; Alt. 6 - 9,618 acres; and Alt. 7 - 9,278 acres.

[6] Both manual and chemical methods would be used under all alternatives except Alternative 6 where manual methods would be employed exclusively.

[7] Treatments not identified in 1972 Allowable Cut Plan.

Table 1-3 Derivations of Timber Production Base Acreage

	Alternatives (acres)					
	PA, 5 & 6	1	2	3	4	7
Intensive Timber Production Base	102,901	141,836	102,288	108,944	70,099	120,329
Constrained Timber Production Base						
ACEC	3,585	0	0	0	0	0
VRM	3,348	0	12,066	7,520	6,400	1,517
Wildlife (MHA[1]-200)	0	0	0	0	20,040	0
Wildlife (MHA-350)	11,763	0	0	0	17,040	0
Riparian Zones	0	0	5,657	0	0	7,510
Municipal Watersheds	0	0	2,835	0	0	0
Recreation/Education Areas	0	0	247	0	0	852
Total Constrained	18,696	0	20,805	7,520	43,480	9,879
Total Timber Production Base[2]	121,597	141,836	123,093	116,464	113,579	130,208

1/ Minimum harvest age.

2/ Refer to Land Use Allocation, Appendix B, Table B-2.

corridors, large and small blocks of old-growth coniferous forest and replacement stands would be maintained by appropriate timber harvesting cycles. These blocks are included in the constrained timber production base (MHA-350 in Table 1-3). However, no timber harvest would be scheduled within designated blocks until wildlife habitat management plans were developed. On the remainder of the land base, wildlife values associated with unique and special habitats (meadows, cliffs, etc.), snags and hardwoods would be given full or partial protection, as dictated by individual management situations.

All public lands would be managed in accordance with objectives to mitigate or, in some cases, avoid impacts of management activities on scenic values. Most highly scenic and/or sensitive areas would be preserved (unharvested) or timber would be harvested at 10 percent removal per decade. Potential ACECs would be protected from actions which could significantly affect critical resource values. Parts of some potential ACECs would be harvested under special constraints (10 percent removal per decade). Some additional areas and facilities would be provided to partially meet projected recreation needs (Table 3-11). One area would be designated and managed as recreation lands.

Alternative 1 - Maximum Timber Production

Except for existing recreation and progeny test sites, all commercial forest land would be allocated to the intensive timber production base (Table B-2), producing an average annual harvest of 118.4 MM bd. ft. A continuation of this cut level would result in final harvest of much younger timber than in the first decade. The youngest timber proposed for final harvest would be in the 50-year age class (decades 8-40) in the Santiam SYU and the 70-year age class (decades 9-40) in the Clackamas-Molalla SYU. The average diameter of trees in these stands would be 13 inches and 17 inches dbh, respectively.

The intensive timber base for this alternative contains approximately 12,000 acres of severely fragile and reforestation problem sites which are withdrawn from timber production under other alternatives. Due to expected reforestation problems and excessive productivity losses, approximately half of these severe sites would be removed from the intensive timber base after harvesting. On the remaining acres, attainment of minimum stocking standards is anticipated following harvest. The costs of attaining stocking standards on fragile and problem sites would be significantly higher than costs of stocking non-problem acres.

This alternative would provide streamside buffer strips (see Glossary) consistent with the Oregon Forest Practices Act. In order to maximize timber production, protection and/or enhancement of wetlands, riparian zones, old-growth and mature forest, scenic areas, natural areas and most other non-commodity resource values would not be provided.

Alternative 2 - Emphasis on Timber Production Consistent with Enhancement of Some Other Values

This alternative represents perpetuation of current management constraints, except that a higher timber yield per acre is expected due to more intensive application of forest management treatments (see Chapter 2, Vegetation). An average annual harvest of 93.1 MM bd. ft. could be sustained.

Under this alternative, protection would be provided for non-timber resource values by withdrawing some lands from the timber production base and placing others in long rotation cycles (up to 240 years). This approach would result in harvest of approximately 6 percent of the acres per decade in the long rotation cycles.

Protection of riparian zones on streams with major anadromous fish runs and/or municipal water diversions would be similar to that of the proposed action except that commercial trees could be harvested. Other streams would generally receive less protection. Protection of old-growth forest as wildlife habitat would be limited to areas where seven northern spotted owl locations have been identified.

No areas would be managed to protect their potential for designation as recreation lands. However, other allocations would protect most primary recreation features throughout the SYUs. Opportunities to develop new recreation sites would be provided to partially meet projected needs. Highly scenic and/or sensitive viewing areas and one Research Natural Area would be protected.

Alternative 3 - Moderate Emphasis on Timber Production Combined with Preservation of Old-Growth Habitat and Enhancement of Other Non-Timber Values

Average annual timber harvest under this alternative would be 91.9 MM bd. ft. Most timber management features are the same as the proposed action. Alternative 3 differs in that more acres are available for intensive timber management.

Riparian zones would be protected on all third order and larger streams by limiting disturbances to road and yarding corridors. The wildlife habitat component would focus on retention (no harvest) of some old growth forest. Recreation and natural area management would be similar to the proposed action with the exception of less intensive timber harvest in buffer zones and fewer areas managed to protect their potential for special designations. Compared to the proposed action, fewer acres would be allocated to preserve visual resources. More acres would be allocated to retention of visual resources, i.e., some timber harvest would be limited to 5 percent removal per decade.

Alternative 4 - Strong Emphasis on Enhancement of Wildlife and Other Non-Timber Values

Under this alternative, a full ecosystem management approach would be used to achieve wildlife habitat diversity (see Appendix D). This approach differs from the proposed action in two ways: (1) large and small blocks of old-growth and mature wildlife habitat would be distributed throughout the SYUs; and (2) a 200-year harvest cycle would be added to assure the retention of mature (116-195 years) forest stands. Unique and special wildlife habitats would be given full protection.

Other resource management provisions include enhancement and protection of: riparian zones on all second order and larger streams; visual resources; potential ACECs; and special recreation management areas. To meet future recreation needs, moderate to high quality areas would be managed to protect their potential for development as new recreation sites and trails.

An average annual harvest of 64.2 MM bd. ft. could be sustained on intensive and constrained land bases. The constrained base, which is intended for visual resources retention, would be harvested at the rate of 5 percent per decade.

Alternative 5 - Accelerate Timber Harvest from Preferred Alternative Timber Management Base

This alternative consists of the same land use allocation and level of intensive management as the proposed action. There are two major differences. First, the youngest age classes scheduled for final harvest in the Santiam SYU would be 50 years in decades 6, 7, 8 and 10-32, and 40 years in decade 9. This younger timber would have average diameters of 13 inches and 11 inches, respectively. Secondly, in the Clackamas-Molalla SYU a departure exceeding even flow (see Glossary) would occur in the first decade. This increase, which exceeds the sustained yield capacity for the intensive timber management base, would result in annual harvests of 99.1 MM bd. ft. during the first decade, 92.0 MM bd. ft. for decades 2 and 3 and 93.0 MM bd. ft. (the even-flow level) for decade 4 and beyond. A regulated forest on the intensive timber production base would be reached around the 40th decade in the Santiam SYU and the 9th decade in the Clackamas-Molalla SYU. This compares to the 14th and 9th decades, respectively, under the proposed action.

By the time a regulated forest condition is achieved, the annual harvest levels from lands allocated to timber production under this alternative could be increased to the highest level sustainable, which is estimated to be 106 MM bd. ft. (see Appendix L for additional details regarding this alternative.)

Alternative 6 - No Control of Competing Vegetation with Herbicides

This alternative is the same as the proposed action in timber base and treatments, except that herbicides would not be used to control grass, brush and hardwoods growing in competition with commercial conifers. This would eliminate herbicide treatments for the control of competing vegetation prior to reforestation (site preparation), during establishment (plantation maintenance) and after young stands become established (release). Control of vegetation for timber management by biological, mechanical or manual methods would be prescribed to approximately the same dollar level of investment as used for herbicides in the proposed action to provide a means of direct comparison between the two alternatives. The average annual timber harvest under this alternative would be 85.8 MM bd. ft.

Continuation of the "no herbicides" alternative beyond the first decade would be expected to result in a reduction in future timber productivity. When the forest reaches regulation under the proposed action (8th decade in the Clackamas-Molalla SYU and 14th decade in the Santiam SYU), productivity would be approximately 13 percent less than would be realized from continuation of the proposed action.

The difference in timber production between this alternative and the proposed action could possibly be narrowed by greater investments in manual and mechanical methods. However, the cost effectiveness of continued manual and mechanical treatments on a given site is questionable. Levels of investment will be addressed in the decision document prepared after the final EIS.

Alternative 7 - No Action (No Change)

This alternative constitutes a continuation of the present allowable cut (86.1 MM bd. ft. per year). In the Santiam SYU, the minimum age class available for final harvest in decades 8-24 would be 70 years. In the Clackamas-Molalla SYU, 80 years would be the minimum age class available for final harvest through the 40-decade projection period. This younger timber would have average diameters of 17 inches and 19 inches, respectively. Continuation of the same management practices and constraints used in the 1972 allowable cut calculation is assumed.

Protection would be provided for recreation sites, fragile areas and some highly scenic areas. Other land use allocations (Table B-2) and management treatments (Table 1-2) proposed under this alternative are those planned for the second decade of the 1972 timber management plan.

FOREST MANAGEMENT TREATMENTS AND DESIGN ELEMENTS

Table 1-2 displays, in typical sequence, the types and levels of treatments for the proposed action and each alternative. Following harvest by clearcut or single tree selection, these treatments would be used to achieve prompt reforestation and to increase subsequent growth of commercial conifers. The following discussion of treatments will be in the same order as listed in Table 1-2.

Not every treatment listed in Table 1-2 would be applied to every acre. A number of treatment combinations are possible and could be employed. The purpose of this section is to discuss each treatment and quantify the magnitude of the actions. Treatments would be identified and scheduled through application of the recently adopted forest data system (Solutions to Operations and Reforestation Monitoring Systems-STORMS, USDI, BLM 1981a). For those actions required in timber sale contracts, the final determination of treatment needs would be made during timber sale planning.

Contracts, usually awarded on a competitive basis, are the means of accomplishing all timber harvest and many forest development projects. The standard and special provisions (which include mitigating measures) in a contract establish the performance standards to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations and policies. In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken and the physical characteristics of the specific site. The standard provisions of the basic timber sale contract, Bureau Form 5450-3, are applicable for all timber sales. Bureau manuals and manual supplements provide a variety of approved special provisions for use, as appropriate, in individual contracts. The combination of selected special provisions constitutes Section 41 of a timber sale contract.

Prior to any vegetative or ground manipulation, BLM requires a survey of the project site for plants and animals listed or proposed for listing on either Federal or official State lists of threatened and endangered species. The Endangered Species Act of 1973 (as amended) authorizes the U.S. Fish and Wildlife Service to identify both plant and animal candidates for inclusion on the Federal lists. BLM has also chosen to recognize and protect plant species identified by the Oregon State Director and the District Manager as either threatened, endangered or sensitive (see Glossary). BLM policy also dictates that animal species identified by the Oregon Department of Fish and Wildlife as threatened, endangered or sensitive be recognized and protected. If a project might affect any listed or proposed threatened or endangered species or its essential habitat (that determined necessary for nesting, reproduction, roosting and/or feeding), the appropriate agency would be consulted. Every effort would be made to modify, relocate or abandon the project in order to obtain a no effect determination.

Whenever evidence of historic or prehistoric occupation is identified during BLM activities, special surveys are undertaken to determine possible conflicts in management objectives. In addition, a Class III (complete) cultural resources inventory is required on all areas to be subjected to ground disturbing activities. This is accomplished in the pre-planning stage of a treatment, and the results are analyzed in the environmental assessment addressing the action (BLM Manual 8100, Cultural Resource Management). When a cultural resource is discovered during timber harvest or associated activities, operations in proximity are immediately suspended and may only resume upon receipt of written instructions from the authorized BLM officer. Procedures under 36 CFR 800 would then be followed including consultation with the State Historic Preservation Officer in the determinations of eligibility, effect and adverse effects.

Transportation System

Oregon Manual Supplement, Release 5-115 of April 10, 1975, would be used in preparing road construction requirements for timber sale contracts. Engineering terminology and types of construction equipment are defined in the manual supplement, and specifications for all phases of construction, reconstruction and surfacing are provided.

Methods of slope protection are provided to avoid collapse of cut-and-fill embankments. Specifications for rock pits and quarries include provisions for minimum visual intrusion, drainage and control of runoff and restoration following use.

Special stipulations are provided for the installation of stream crossing structures, such as corrugated metal culverts, so that fish passage is not impeded. These measures may include imposing gradient limitations for the structures and/or installing baffles to reduce water velocity through the culverts.

One section of the manual supplement provides design features to control and minimize erosion during road construction and throughout the design life of a road. Another section addresses soil stabilization practices including planting, seeding, mulching and fertilizing for establishment of soil-binding vegetation.

During the 10-year period, approximately 50 miles of road would be reconstructed under the proposed action and all alternatives. Reconstruction is required to eliminate design problems, obsolete structures (bridges, culverts) and unsafe features which exist on a portion of the 860 miles in the existing road system. On the average, an estimated 9.6 miles of new, permanent road would be constructed annually, during the decade, for the proposed action and Alternatives 5 and 6. Alternatives 1-4 and 7 would require an annual construction of 10.4, 9.7, 9.3, 8.6 and 15.0 miles, respectively. An estimated 65 miles (520 acres) of additional roads are necessary to complete the SYUs' permanent road system (spur road construction of less than 1 mile excluded) for the proposed action and all alternatives except 3 and 4. Therefore, the permanent road system would not be completed until the end of the second decade. Construction standards, i.e., stream crossing, subgrade width, ditch, cut-and-fill slope requirements, and type of surfacing would be determined during the annual timber sale planning process. Basic construction operations and a brief history of transportation systems are described in detail in the programmatic environmental impact statement prepared on timber management in the western United States (USDI, BLM 1975), hereafter referred to as the BLM Timber Management FEIS.

Timber Harvest

The primary timber harvest method used during the next 10-year period would be clearcutting. An estimated 24 percent of the proposed final harvest by clearcutting (See Table 1-2 for proposed acreages by alternative) would be accomplished by ground or surface cable yarding systems. Another 47 percent would be accomplished by cable yarding systems providing partial log suspension and 16 percent providing full log suspension. The remaining 13 percent would be harvested by tractor skidding, of which 21 percent would be accomplished using "low ground pressure" equipment. This variety in logging systems is a design feature employed primarily for water quality protection and reduced soil damage. Refer to the BLM Timber Management FEIS (USDI, BLM 1975) for a detailed description of logging systems.

Timber harvest limitations pertaining specifically to clearcutting, as identified in the Church Report (U.S. Congress, Senate 1972), have been adopted by BLM. These limitations are incorporated in Oregon Manual Supplement 5424 which lists special provisions or stipulations for the logging requirements portion of a timber sale contract. Alternative 1 would not be fully consistent with the 5-year regeneration limitation.

Acreage allocated to the constrained timber base (Table 1-3) for visual concerns would be harvested utilizing small clearcuts (1-3 acres) and a two-stage shelterwood method (two entries into the same stand). The first shelterwood entry, or regeneration cut, would remove 30 to 60 percent of the original stand basal area. The second entry, or final harvest cut, would occur when regeneration is established and has grown to a height that hides stumps and debris (approximately 7 to 10 years.) The acreage figures (shelterwood) shown in Table 1-2 are those proposed for regeneration cut.

Single tree selection would be employed for harvest of dead and dying timber (mortality salvage) in stands not scheduled for final harvest within the 10-year period. Mortality salvage would take place on lands in both intensive timber and constrained timber production bases and on all other lands in the event of a major catastrophic event or when beneficial to wildlife or fish. The variance in acreages proposed for mortality salvage (Table 1-2) reflects the differences in 80+ year-old timber in the timber production bases available under each alternative.

Commercial thinning would occur in intensively managed timber stands between the ages of 30 and 70 years which have attained merchantable size. The interval of treatment (ranging from 7 to 30 years) would vary by site, with poor sites having longer intervals. Acreages proposed for commercial thinning are presented by alternative in Table 1-2.

Site Preparation

Site preparation treatments are used to prepare newly harvested and inadequately stocked areas for planting a new crop of trees. Four types of site preparation treatments (broadcast burning, herbicide application, manual slashing and mechanical scarification) are planned within the SYUs for the 10-year period (Table 1-2). In addition to the conifer base lands, selected acres identified as productive conifer sites currently occupied by brush and/or unmerchantable hardwood stands would be scheduled for conversion using one or a combination of site preparation treatments (Table 1-2, footnote No. 4).

The main site preparation treatment would be broadcast burning to control competing vegetation, make planting sites accessible and reduce fire hazard. Burning would occur at times approved by the Oregon State Department of Forestry, administrators of the Smoke Management portion of the State's Air Quality Implementation Plan. Acreage requiring slash disposal by broadcast burning (Table 1-2) may receive one or more site preparation treatments.

Site preparation using herbicides (Table 1-4) is included in all alternatives except Alternative 6. Herbicides are used to control grasses, forbs, brush and undesirable tree species prior to reforestation. This treatment improves the potential for success by reducing competition for light, moisture and soil nutrients during the tree seedling establishment period. Certain lands have been identified for prescription burning, an integrated program of herbicide application and broadcast burning. These acres are identified in Table 1-4 and are included under both broadcast burning and herbicide application in Table 1-2. Application and monitoring of herbicides would be

Table 1-4 Estimated 10-Year Use of Herbicides Based on Proposed Action Acreage[1/]

Chemical	Method	Season	Carrier	Target Species	Application Rate[2/] (lbs./acre)	Proposed Action	Estimated Acres Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
SITE PREPARATION												
Atrazine	Aerial	Spring	Water	Annual and perennial grasses and forbs	4.0	1,000	1,330	1,040	1,000	670	1,090	990
Roundup (glyphosate)	Aerial	Spring	Water	Salmonberry, Vine Maple	3.0	1,000	1,330	1,040	1,000	670	1,090	990
Tordon 101 (picloram-2,4-D)	Aerial	Early Summer	Water	Preburn Spray	10.0	1,050	1,340	1,090	1,000	620	1,130	0
Tordon 101R (picloram)	Hand	All Seasons	Undiluted	Bigleaf Maple (cut stumps)	0.5	2,000	2,650	2,080	2,000	1,340	2,190	1,970
STAND RELEASE												
2,4-D	Aerial	Summer	Water	Red Alder, Ceanothus, (mixed hardwoods)	2.0	500	680	520	510	350	550	490
2,4-D	Aerial	Spring	Water & Diesel	Red Alder, Ceanothus, (mixed hardwoods)	3.0	500	670	520	510	340	550	490
Garlon 3A (triclopyr)	Aerial	Late Summer	Water	Bigleaf Maple	3.0	1,000	1,350	1,040	1,020	690	1,100	980
Roundup (glyphosate)	Aerial	Late Summer	Water	Salmonberry, Vine Maple	1.5	2,000	2,700	2,080	2,040	1,380	2,200	1,960
Krenite	Aerial	Late Summer	Water	Red Alder, Vine Maple, Blackberry	3.0	1,000	1,350	1,040	1,020	690	1,100	980

1/ Herbicides would not be used under Alternative 6.

2/ Active ingredients (in total pounds) applied may be figured by multiplying the application rate by the estimated acres under each alternative.

in accordance with BLM's FEIS Vegetation Management with Herbicides: Western Oregon-1978 through 1987 (USDI, BLM 1978b). See the following Plantation Maintenance and Release section for more detail.

Manual site preparation would occur on some acreage during the proposal period (Table 1-2). Treatments could consist of scalping or brush cutting and piling slash for burning.

Mechanical site preparation would consist of scarification and piling or windrowing of slash, brush and unmerchantable trees, using a bulldozer equipped with a brush blade. Operations would be restricted to slopes less than 35 percent with low soil moisture conditions and suitable soil types.

Planting

To achieve adequate reforestation within 5 years following harvest on timber production lands, harvested areas would be planted with commercial conifers within 1 year of the completion of harvesting. Planting stock is nursery grown from seed collected on sites and at elevations similar to the specific project area. Additionally, the planting of genetically improved seedlings would be scheduled (see Table 1-2, footnote 5). The "genetic tree improvement program", which is designed to increase tree growth, will be phased in over the next five decades. Diversity in the gene pool (see Glossary) will be maintained through establishment of a preservation orchard containing approximately 1,400 genetic combinations and by reforesting with "natural" seedlings (ie., grown from naturally pollinated seed) on 10 percent of the harvest acres in each breeding unit (see Glossary). The broad selection of parent trees for genetically improved stock is an additional safeguard intended to maintain genetic diversity (BLM Instruction Memorandum OR 79-334).

Reforestation experience in the SYUs shows that target stocking levels of 245 to 320 trees per acre, depending on site class, cannot always be achieved in the initial planting. Post-treatment surveys would be conducted to determine the rate of survival and whether replanting or interplanting would be required to meet stocking standards.

Plantation Protection

Estimated acreages that would require some type of protective treatment are shown in Table 1-2. Depending on the alternative, approximately 300 to 500 acres infected with laminated root rot would be treated to restrict spreading of the disease. Another treatment would protect seedlings from the sun by shading them with wooden shingles or wax-coated cardboard. Seedlings would be protected from deer, elk, mountain beaver and other small animals by plastic tubing or netting, bud capping and application of big game repellant (BGR). Mountain beaver would be trapped when they occur in significant numbers in a plantation. Seed orchards and progeny test sites would be fenced. Specific areas requiring each of these treatments would be identified in conjunction with normal reforestation surveys.

Plantation Maintenance and Release

Plantation maintenance treatments (see Glossary) promote the survival and establishment of conifer seedlings. Release treatments (see Glossary) reduce competition for light, moisture and nutrients between shrubs or grass and existing commercial conifer seedlings and promote dominance and growth of established conifers.

Fast-growing hardwoods, such as red alder or vine maple, overtop and suppress slow-starting conifer seedlings. The degree and type of competition varies by site. On dry sites, grass competes effectively for water. Elsewhere, hardwoods grow rapidly, shutting out essential light and competing for water during periods of low soil moisture. With reduced competition, conifers grow rapidly beyond the point where they can be overtopped and further suppressed by surrounding vegetation. When this growth situation is achieved (approximately 3 to 10 years from planting), no further control of competing vegetation is necessary.

Each area proposed for maintenance or release treatment would undergo a site-specific environmental assessment. During this analysis, various methods of vegetation control would be considered (chemical, manual and mechanical).

In recent years, herbicides (see Table 1-4) have been used effectively to inhibit the growth of competing vegetation, thus increasing available water, nutrients and light for suppressed conifers. Herbicides are applied aerially or by several ground methods. The method of application selected is dependent on costs, topography, equipment limitations, kind and distribution of target plants, potential environmental impacts and biological conditions. Most herbicides proposed for use in the SYUs would be applied by helicopters equipped with positive shut-off spray systems to limit herbicide application to target areas. Helicopter application would be accomplished under contract through the competitive bidding process.

Timing of herbicide application is stringently controlled. Temperature, humidity and wind direction and speed must be measured and assessed prior to and during application. BLM has full authority to order cessation of operations based on adverse field conditions. Equipment and operators are frequently checked by field project supervisors. Only registered chemicals would be used and in accordance with instructions on container labels. Handling, storage and application of chemicals would be in accordance with Oregon Forest Practices Act rules (see the Interrelationships section, State and Local Government).

Design features included in herbicide project plans and contracts for application receive site-specific environmental assessment. Assessments addressing specific herbicide projects are prepared and tiered (see Glossary) under BLM's FEIS Vegetation Management with Herbicides: Western Oregon - 1978 through 1987.

Procedures for protecting stream buffers (determined according to stream classification and herbicide used) and monitoring of herbicide application are described in the FEIS mentioned above. Continuous administration of spraying contracts in progress is required. Water samples of adjacent streams are taken prior to spraying to establish baseline quality and at specified intervals thereafter.

The use of herbicides for release is included in all alternatives except Alternative 6. Table 1-4 shows the chemicals, target species and estimated acreage of herbicide use as proposed during the 10-year period. Alternative 6 employs manual methods for release of approximately 2,200 acres. Depending on the alternative, approximately 400-600 acres would receive manual treatment during the 10-year period. Manual release would consist of clearing around selected commercial tree species using hand tools.

Precommercial Thinning

Precommercial thinning would be applied to timber stands between 10 and 20 years of age which contain over 500 stems per acre. This treatment concentrates available nutrients, moisture and light on selected trees, decreasing the time needed to reach merchantable size.

The number of trees removed per acre during precommercial thinning is dependent on the density of a stand before thinning and desired spacing at first commercial harvest. While average spacing is approximately 12 feet, the number of crop trees left may vary between 245 and 320 per acre. Contract specifications, emphasized by field instructions to crews, cover desired spacing of crop trees and criteria for crop tree selection.

Fertilization

Portions of precommercially and commercially thinned areas would be fertilized (Table 1-2). Prior to fertilization a detailed on-site soil analysis would be employed to determine composition of fertilizer needed, rate of application and timing between applications. The average application is expected to be 200 pounds of nitrogen per acre beginning when a stand is precommercially thinned and at 10-year intervals thereafter until 10 years before final harvest. In addition to acceleration of growth for up to 7 years following treatment, fertilization helps overcome the temporary nutritional imbalances (shock) caused by other forest management practices such as slash burning, herbicide application and thinning.

COMPARISON OF IMPACTS

Table 1-5 is a summary of some impacts anticipated under the proposed action and each alternative. All impacts are described in Chapter 3. Selected impacts are summarized in this chapter to give decisionmakers and reviewers an overview of major issues, alternatives and anticipated changes in existing conditions.

The major issues involved in future timber management are fish and wildlife habitat modification and impacts on economic conditions. With regard to habitat modification, the most significant impact would be harvest of all but 60 acres of old-growth forest under Alternative 1. Populations of plants and

Table 1-5 Summary of Impacts

Environmental Components Impacted	Units of Measure	Existing Condition	Change in Existing Conditions (Totals or Ratings)								Remarks
			Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	Alt. 7 No Action	
Soils											
Productivity	Acres of lost productivity/ decade	2,837	1,578	2,006	1,462	1,613	1,158	1,769	1,619	1,762	Impacts from compaction, topsoil removal, dry ravelling, debris avalanches and debris torrents.
Water Resources											
Water yield	ac. ft./year	897,320	890,312	898,267	891,312	890,625	883,143	892,566	889,316	891,515	Annual total at end of 1st decade.
Sediment yield	tons/year	24,802	23,815	25,511	24,027	23,865	22,265	24,285	23,607	24,329	Annual total at end of 1st decade.
Vegetation											
Acres denuded											
Road construction	acres/decade	1,780	771	828	776	743	685	771	771	1,197	
Plant Habitat Altered by Herbicide use	acres/decade	14,765	10,050	13,400	10,450	10,100	6,750	11,000	0	8,850	
Timber harvest	acres/decade	26,865	16,107	20,617	15,194	16,214	10,822	17,345	15,560	16,801	
Wildlife Habitat											
Total habitat modified	acres/decade	34,900	28,500	35,300	28,100	29,900	19,800	29,700	27,900	31,100	Roads, harvest, precommercial thinning and stand conversion.
Early successional stage 5th decade	acres	25,200	34,300	40,000	35,400	35,200	23,800	35,500	31,500	25,500	Habitat less than 15 years old.
Mature stage, 5th decade	acres	10,900	11,300	4,900	14,000	11,000	23,100	11,300	11,600	8,500	Habitat 116-195 years old.
Old-growth stage, 1st decade	acres	27,300	20,800	19,200	20,500	21,300	22,700	20,400	21,100	11,000	Habitat 196 years and older.
Old-growth stage, 5th decade	acres	27,300	10,800	60	7,900	12,900	15,200	10,800	10,800	4,000	" " "
Wildlife											
Elk	Population level	Moderate	+	- -	-	+	++	+	+	- -	Change during next 5 decades
Old-growth-related species	Population level	Low	-	- -	- -	-	-	-	-	- -	Change during next 5 decades
Spotted owls	Locations	15[1]	10	0	5	10	9	10	10	1	Change at end of 1st decade using 300/900-acre criteria.
Spotted owls	Locations	12[1]	2	0	0	0	0	2	2	1	Change at end of 1st decade using 1,000-acre criteria.
Fish											
Habitat	Resource conditions	Fair	+	-	0	+	+	+	+	-	Change during next 5 decades.
Populations	Population levels	Moderate	+	- -	0	0	++	+	+	0	Change during next 5 decades.

Table 1-5 Summary of Impacts (Continued)

Environmental Components Impacted	Units of Measure	Existing Condition	Change in Existing Conditions (Totals or Ratings)								Remarks
			Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	Alt. 7 No Action	
Recreation											
Facility oriented	Resource conditions	Good	-	- -	0	-	+	-	-	0	Change during next 5 decades.
Non-facility oriented	Resource conditions	Fair	+	-	-	0	++	+	+	-	Change during next 5 decades.
Cultural Resources											
Known sites	Resource conditions	Fair	0	-	0	0	0	0	0	-	Change during next 5 decades.
Visual Resources											
VRM Class I	Resource condition	Good	0	- -	0	0	0	0	0	- -	Change during next 5 decades.
VRM Class II	Resource condition	Fair	-	- -	- -	0	+	-	-	- -	Change during next 5 decades.
VRM Class III	Resource condition	Fair	-	- -	-	-	+	-	-	- -	Change during next 5 decades.
VRM Class IV	Resource condition	Poor	+	-	-	+	+	+	+	-	Change during next 5 decades.
Potential Areas of Critical Environmental Concern	Resource condition	Good	0	- -	-	0	0	0	0	- -	Change during next 5 decades.
Energy Use	Trillion Btu's consumed/year	.330	.456	.582	.466	.460	.331	.492	.428	.452	Average annual consumption during first decade
Socioeconomic[2/]											
Total earnings	$ thousands	$34,275	+$4,297	+$15,357	+$4,941	+$4,644	-$ 9,436	+$7,560	+$2,343	+$2,104	Changes compared to existing condition
Total employment	jobs	2,610	+ 319	+ 1,128	+ 362	+ 344	- 698	+ 561	+ 174	+ 150	" " "
O&C payments[4/]	$ thousands	$10,173	+$1,341	+$ 4,884	+$1,594	+$1,467	-$ 2,961	+$2,353	+$ 708	+$ 708	" " "
Total earnings	$ thousands	3/	+$2,193	+$13,253	+$2,838	+$2,543	-$11,539	+$5,455	+$ 238	$36,378	Changes compared to no action condition
Total employment	jobs	3/	+ 169	+ 978	+ 212	+ 194	- 848	+ 411	+ 24	2,759	" " "
O&C payments[4/]	$ thousands	3/	+$ 633	+$ 4,176	+$ 886	+$ 759	-$ 3,669	+$1,645	0	$10,881	" " "

+ = Beneficial   - = Adverse   0 = None or Negligible

[1/] Locations which presently meet 300/900-acre or 1,000-acre criteria.

[2/] See Chapter 3, Impacts on Socioeconomic Conditions, for discussion of dual impact measures.

[3/] Base condition for these impacts shown under Alternative 7, No Action.

[4/] Data artificially derived. See footnote No. 1 in Table 3-23.

animals associated with old-growth forest would decline on BLM-administered land as old growth is harvested. Under Alternative 4, old growth would be reduced by harvesting during the next five decades, but in the sixth decade, the amount of old growth would stabilize and begin to increase to the benefit of plant and animal species.

Alternative 1 would be most beneficial to the economic situation, providing an estimated 978 additional jobs than the No Action program. Alternative 4 would have the greatest adverse impact, providing an estimated 848 fewer jobs than the No Action program.

IMPLEMENTATION

Final Decisions

After release of the final EIS (but not before conclusion of the 30-day comment period), the District Manager will review public comments on both draft and final EISs and prepare a Record of Decision. The decision may be to select one of the EIS alternatives (including the proposed action) intact or to blend features from several alternatives that fall within the range of actions analyzed in the EIS. Significant conflicts, alternatives, environmental preferences, economic and technical considerations and the Bureau's statutory mission will be addressed in the Record of Decision. The decision is expected by the Summer of 1983.

Monitoring and Studies

BLM land management programs are monitored in various ways. Currently, forest management practices are monitored primarily through administration of contracts under which most actions are authorized. Timber sale contracts are inspected at least once a week, when active, and more often if sensitive operations are in progress. Daily administrative visits are not uncommon when harvest is moving at a fast pace, slash disposal is occurring or road construction involving critical aspects (such as stream crossing structures) is taking place. Service contracts for activities such as tree planting, precommercial thinning, tubing, manual brush cutting and fertilization are monitored at regular intervals to determine the quality and quantity of completed work. Depending on experience of the contractor and rate of progress, visits to these operations vary from twice a week to the full-time presence of a Bureau contract administrator. Daily visits usually occur when there is reason to believe that the operator will require help in interpreting contract requirements.

Effectiveness of silvicultural treatments is monitored through a series of inventories and surveys performed at various times during a stand's life. Appropriate stocking surveys (see Glossary) are performed prior to and after a treatment is accomplished. Information from these surveys identifies the need for or success of a particular silvicultural treatment. This information is documented and maintained in operations and reforestation records systems.

In addition, plans are in progress for expansion of current inventory plots (see 1978 Forest Reinventory, Appendix B) to measure actual growth responses from fertilization and thinning programs in the SYUs.

Water quality monitoring would be carried out in accordance with Executive Orders 11514 (partially amended by 11991) and 12088, Sections 208 and 313 of the Clean Water Act (PL 95-217, PL 92-500 as amended), BLM Manual 7240 and Oregon Department of Environmental Quality Memorandum of Understanding (MOU-OR 158). Standard analytical methods would be followed.

Additional monitoring systems for forest management and other resource management programs (wildlife, watershed, visual, cultural, recreational, etc.) as identified and outlined in the final decision would be developed and implemented.

Requirements for Further Environmental Assessment

This EIS is best described as a regional programmatic statement for the proposed 10-year timber management plan and is considered applicable for the decade. A series of environmental assessments (EAs) will be prepared annually on detailed timber management plans. Interdisciplinary impact assessment will be tiered within the framework of this and other applicable EISs.

An EA of a timber sale (or group of sales) will address the effects of harvest methods, yarding systems, road construction or reconstruction, slash disposal and any other treatments conducted under the terms of a timber sale contract. EAs will also be prepared for forest development projects, such as precommercial thinning, animal damage control, fertilization and herbicide application. EAs may lead to mitigation resulting in modest net impacts. With problems and conflicts identified through analysis, it is possible to design the proposed project in an environmentally sensible manner. Where the action is to be accomplished by a contractor, the EA is a primary means for determining appropriate contract stipulations. Projects to be accomplished by BLM personnel are conducted in accordance with findings of assessments and decision documents.

If an EA indicates potential for significant impacts not already described in an existing EIS, another EIS or a supplement to an existing EIS may be required.

INTERRELATIONSHIPS

Due to the scattered nature of BLM-administered land in the SYUs, coordination of timber management activities with adjacent landowners and managers is essential. Good working relationships are established and will continue in the future. BLM also works closely with other government agencies responsible for special resource management coordination programs. The following subsections provide a brief description of major interrelationships involving timber management.

Federal Government

The Eastside Salem SYUs share in part common boundaries with the Mt. Hood and Willamette National Forests. Coordination between the Salem District Manager and the Forest Supervisors is routine. Specific project and program coordination takes place as needed between all management levels of each agency and also between resource specialists. A cooperative agreement provides for interagency road construction and use.

The U.S. Army Corps of Engineers (Corps) has the authority, under Section 404 of the Clean Water Act of 1977 (P.L. 95-217), to regulate the discharge of dredged or fill materials into any estuary, wetland or stream in the United States with a flow in excess of 5 cubic feet per second. Based on the adequacy of BLM environmental protection practices, the Corps has issued BLM a general permit for dredge or fill activities. Under the permit, BLM provides the Corps, the State Division of Lands and certain environmental review agencies with advance notice of specific proposed projects.

The U.S. Fish and Wildlife Service administers the Endangered Species Act of 1973 (as amended). Accordingly, BLM consults with that agency when it is determined that a threatened or endangered species or its critical habitat may be affected. The purpose of consultation is to avoid impacts to the species in question. Such consultation may result in modification or abandonment of an action.

The National Park Service (NPS) administers the Nationwide Rivers Inventory, as provided under the National Wild and Scenic Rivers Act of 1968. Present efforts are directed toward inventory and evaluation to determine which free-flowing rivers and river segments are suitable for possible designation as components of the National Wild and Scenic Rivers System. BLM consultation with NPS is required if proposed management actions could alter a river's ability to meet established Wild and Scenic Rivers Act eligibility and/or classification criteria.

State and Local Governments

Section 202(c) of the Federal Land Policy and Management Act requires BLM to coordinate its planning efforts with those of State and local governments; assist in resolving inconsistencies in mutual planning efforts; provide for State and local government involvement in development of BLM land use programs, regulations and land use decisions; and develop BLM resource management plans and programs consistent with those of State and local government to the extent that such BLM plans and programs are also consistent with Federal law and regulations. BLM coordination efforts involve a number of State and local administrative and planning agencies as highlighted below.

The Intergovernmental Relations Division for the State of Oregon is the Clearinghouse for State agencies. Notices of all BLM planning and major proposed actions are provided for coordinated State level review by the State Clearinghouse. Regional Councils of Government serve as the clearinghouses for coordinated review of proposed BLM activities by county and local governments in their respective areas of interest. BLM involvement with the four counties in the SYUs is largely via boards of county commissioners and departments, such as planning, roads and parks. Through these bodies, county governments participate in planning for land use, road construction and recreational developments on public lands administered by BLM.

The Oregon Land Conservation and Development Commission (LCDC) administers the state comprehensive land use planning program as provided in Oregon State Statutes, Chapter 197 (ORS 197). Under this program, county and local governments are required to develop comprehensive land use plans and implementing ordinances consistent with 14 statewide planning goals and guidelines. These call for a balance between conservation and development to best meet public needs. The relationships of the Eastside Salem proposed action and alternatives to the LCDC goals are shown in Table 1-6.

Throughout the planning process, BLM has worked with the four counties in the Eastside Salem SYUs to achieve consistency with local plans. Methods of involving local governments have included: (1) frequent informal contacts to discuss local planning concerns; (2) invitations to participate in public tours, workshops and meetings; and (3) discussions with county commissioners and planning departments to determine consistency of BLM's preferred land use plan with acknowledged local plans.

The status of county plans involving lands in the SYUs as of December 10, 1981, is shown below:

County	Plan Adopted (By Board of Commissioners)	Plan Acknowledged (Accepted by LCDC)
Clackamas	x	
Linn	x	
Marion	x	
Multnomah	x	x

Upon release of the draft EIS, appropriate counties will be asked to determine the consistency of timber management alternatives with adopted plans. County responses will be published in the final EIS.

The Oregon State Forester, by means of the Forest Practices Act of 1972, regulates timber harvest methods and supportive practices on all non-Federal lands within the SYUs. Minimum standards are prescribed relating to the following forest practices:

- Reforestation of economically suitable lands.
- Road construction and maintenance on forest land.
- Chemical applications.
- Slash disposal.

Although Federal agencies are not bound by State forest practice rules, BLM minimum standards meet or exceed State rules. The BLM and U.S. Forest Service (USFS), acting jointly, have entered into a Memorandum of Understanding with the State Forester in this regard.

Table 1-6 Relationships of Eastside Salem Proposed Action and Alternatives to LCDC Statewide Goals[1/]

LCDC Statewide Goal Number and Description	Discussion
1. To insure citizen involvement in all phases of the planning process.	BLM land use planning process provides for public input at every stage--from assistance in the initial inventory to identification of management opportunities, development of alternatives, environmental analysis and final decision.
2. To establish a land use process and policy framework as a basis for all decisions and actions.	The proposed action and all alternatives have been developed in accordance with the land use planning process authorized by the Federal Land Policy and Management Act of 1976 which provides a framework for all decisions and actions.
4. To conserve forest lands for forest uses.	The planning area is predominantly forest land. The proposed action and alternatives provide retention of inventoried forest lands for forest uses. The proposed action and Alternatives 1, 2, 3 and 5 place emphasis on increased timber production. Alternative 4 stresses non-timber values, Alternative 6 excludes use of herbicides in forest management, and Alternative 7 would require a reversion to 1972 management goals and no increase in timber production. Alternatives 1 and 5 would exceed the productive capacity of the land base.
5. To conserve open space and protect natural and scenic resources.	All alternatives conserve open space and protect mineral resources. All alternatives except 1 protect scenic resources to some degree. Adverse impacts to visual resources, cultural resources, wildlife habitat, water resources and unique natural areas are greatest under Alternative 1 and least under Alternative 4 (see Table 1-5).
6. To maintain and improve the quality of the air, water and land resources.	Only Alternative 1 does not address enhancement of land and water quality for multiple use of forest lands or for meeting Federal and State minimum water quality standards. Smoke from slash burning will affect air quality, primarily at upper atmospheric levels. All alternatives would comply with the statewide smoke management plan.
7. To protect life and property from natural disasters and hazards.	All alternatives include identification of potential hazard areas and general BLM program and operational measures for protection of life and property from natural disasters and hazards.
8. To satisfy the recreation needs of the citizens of the State and visitors.	Alternative 4 would meet recreation needs on BLM-administered land by the addition of developed sites, designation of recreation lands or designation of other areas for specific activities. The proposed action and Alternatives 2 through 7 would provide opportunities to meet most recreation needs through similar, but fewer, provisions. Alternative 1 would fail to adequately meet increasing needs.
9. To diversify and improve the economy of the State.	Alternative 1 would increase timber production for greatest economic return but would lack diversity in that little or no special attention would be given to non-timber values. Alternative 5 would assist in filling the forthcoming timber supply gap, provide a moderate, long-term increase in economic return from timber harvest and maintain diversity of non-timber values. With the exception of short-term, accelerated timber harvest returns, the proposed action and Alternatives 2 and 3 would provide economic benefits similar to Alternative 5. Alternatives 4 and 6 would not provide for increased timber production.
13. To conserve energy.	Conservation and efficient use of energy sources are objectives in all BLM activities. Use of cull logs and slash for chips and firewood is encouraged.

[1/] LCDC goals not generally applicable to the proposal and alternatives are: 3. Agricultural Lands; 10. Housing; 11. Public Facilities and Services; 12. Transportation; 14. Urbanization; 15. Willamette Greenway; 16. Estuarine Resources; 17. Coastal Shorelands; 18. Beaches; and 19. Near Shore Ocean and Continental Shelf.

In order to comply with the Clean Air Act of 1963 (as amended), BLM cooperates in the Statewide Smoke Management Plan administered by the Oregon State Forester. The primary objective of the plan is to keep smoke from slash disposal operations away from population centers. Slash burning is allowed only when smoke dispersion conditions are determined by Oregon State Department of Forestry (OSDF) to be favorable.

OSDF is the primary contractor for fire protection of public lands administered by BLM in the SYUs. The department undertakes presuppression and suppression actions for all lands in the area.

The Forestry Program for Oregon (Oregon State Department of Forestry 1977) outlines basic objectives of the Oregon State Board of Forestry for timberland management within the State. The relationship of the proposed action and alternatives to these basic objectives is shown in Table 1-7.

Management of fish and wildlife within the SYUs is the responsibility of the Oregon Department of Fish and Wildlife (ODFW). BLM is responsible for managing fish and wildlife habitat under its jurisdiction. Cooperative agreements delineate the specific responsibilities of the two agencies.

The Oregon Department of Environmental Quality (ODEQ) has lead responsibility for statewide water quality management planning in accordance with the Federal Water Pollution Control Act (Section 208 of P.L. 92-500) as amended by the Clean Water Act (P.L. 95-217). BLM and ODEQ have entered into a Memorandum of Understanding which outlines respective roles in meeting State water quality objectives. The Memorandum assures close interagency cooperation, development and implementation of appropriate practices and control measures to comply with the Clean Water Act and State requirements. BLM forest management practices meet or exceed objectives of the statewide water quality management plan.

Private Landowners

The major cooperative undertaking with the private sector involves access acquisition. In the SYUs, there are currently 55 right-of-way and road use agreements and 143 road easements in which BLM is involved. The right-of-way and road use agreements are reciprocal arrangements, whereby one party agrees to allow the other access across its land. An easement secures access for a fee.

Occasionally, BLM and private timber interests cooperate in planning development of adjacent holdings. This planning includes identifying mutually beneficial road and harvest locations. Joint planning helps minimize unnecessary road construction and uneconomical logging units.

The effects of road construction, harvest and reforestation on adjacent and nearby private land are given careful consideration in timber sale planning. Residences, water diversions, crops and plantations are protected as needed. Unavoidable impacts are mitigated whenever possible.

Table 1-7 Consistency[1/] of the Proposed Action and Alternatives with the Basic Objectives of the Forestry Program for Oregon

Basic Objective	Proposed Action and Alternatives Consistent	 Minimally Consistent	 Inconsistent	Discussion
To maintain the maximum potential commercial forest land base consistent with other resource uses while assuring environmental quality.	1		PA, 2, 3, 4, 5, 6, 7	The benchmark (134,184 acres) for consistency is the commercial forest land base minus withdrawn TPCC lands. Environmental quality would be protected to the degree specified in the Oregon Forest Practices Act. Alternative 1 would not meet management guidelines for certain lands as mandated by Congressional Acts and Federal Executive Orders (See Purpose and Need Section) because of impacts on fragile and reforestation problem areas, threatened and endangered species and riparian zones.
To identify and implement the levels of intensive forest management required to achieve maximum growth and harvest.	PA, 1, 2, 3, 4, 5	6, 7		BLM currently implements a full range of intensive timber management practices (refer to Forest Management Treatments and Design Elements, this chapter) for optimizing timber production. New and improved practices would be implemented consistent with technological advances.
To maintain community stability by remaining flexible for increases in future harvest levels that would offset projected shortages.	1, 5		PA, 2, 3, 4, 6, 7	The benchmark for consistency is the Salem Eastside "Fair Share" target of 97 MM bd. ft./yr. as determined by OSDF. Flexibility in harvest levels would be achieved by Alternative 5, which includes a deviation from even flow. Under present Federal mandates, this alternative could not be selected.

[1/] Arrived at through consultation with Oregon State Department of Forestry (OSDF)

CHAPTER 2

AFFECTED ENVIRONMENT

CHAPTER 2 AFFECTED ENVIRONMENT

This chapter addresses the environment as it exists today within the Eastside Salem SYUs. Since timber has been harvested within the SYUs for several decades, much of the environment has been affected by human use.

Chapter 2 provides a basis for assessing impacts of the proposed action and alternatives. Data and analysis will be commensurate with the importance of impacts, with less important material summarized, consolidated or simply referenced.

The primary data sources used in preparing this chapter were BLM planning system documents developed by the Salem District. The Unit Resource Analysis (URA), Planning Area Analysis (PAA) and proposed Management Framework Plan (MFP) for the Eastside Salem area are available for review at the Salem District Office.

Other references supplementary to or updating planning system data are cited within the body of the text by author and date of publication. A listing of these references appears in the References Cited section.

TOPOGRAPHY AND GEOLOGY

The SYUs are located in the Western Cascades and Willamette Valley physiographic provinces. Typical landforms in the Western Cascades include steep, east-west ridges and V-shaped canyons cut by the Sandy, Clackamas, Molalla and Santiam Rivers and tributaries. Bottomland is scarce. Volcanic geology predominates throughout the province. The Western Cascades merge to the west with rolling hills, basins and broad alluvial flats of the Willamette Valley province. Silt, sand and gravel sediments, deposited by the Willamette River and its tributaries, cover most of the province. Isolated high hills are formed by intrusive rocks that are more resistant to erosion. Ancient marine sandstones and shales are exposed in some areas.

CLIMATE

The SYUs have a marine climate with wet, mild winters and moderately warm, dry summers. Since marine air normally moves across the area, humidity is generally high. Relative humidities at night approach 100 percent throughout the year. However, humidity decreases to as low as 10 percent when masses of very dry continental air cross the Cascade Range from the east. The arrival of these air masses causes very high summer or very low winter temperatures. These conditions seldom exceed 2 weeks duration.

Average annual precipitation in the SYUs ranges from 40 inches in the Willamette Valley to 80 inches or more on the higher elevations of the western Cascade slopes. Sixty to seventy percent of precipitation falls between November and March. Below elevations of 2,000 feet, most of it occurs as rain. Snowfall increases dramatically with increased elevation. Between 1,500- and 3,500-foot elevation, snow cover usually lasts 7 to 8 weeks, averaging 10 inches in depth. Snowfall at lower elevations usually melts within a day or two.

Seasonal temperature variations are slight in the SYUs. Winter temperatures below 10° F and summer temperatures above 100° F are unusual. Mean annual temperatures range from 46° F in the higher elevations to 53° F near the valley.

AIR QUALITY

The SYUs are areas of low population density with few of the attendant vehicular and industrial air pollution sources of the nearby Willamette Valley. Air quality contamination sources within the SYUs are vehicle traffic (exhaust and dust), light industry in several small towns and burning of forest slash and grass stubble.

The largest contaminants source associated with BLM activities is slash burning. Over the past decade, BLM has burned slash in 8 to 40 timber harvest units per year, involving 250 to 1,000 acres annually. These burns add considerable amounts of smoke to the atmosphere. This smoke is made up of more than 90 percent water vapor and carbon dioxide, with some particulates and other chemical elements. During slash burning, a highly visible smoke plume is carried into the upper air by heat convection. With proper timing of burns, the smoke disperses and moves east away from population centers. Under unusual circumstances, smoke may settle over populated areas, causing local concern.

Visible smoke problems in selected areas have been monitored by the Oregon State Department of Forestry (OSDF) since 1975. The OSDF records for 1975 to 1980 show that slash burning by BLM created no visible smoke problems in that portion of the Willamette Valley adjacent to the SYUs (Oregon State Department of Forestry 1975-1981).

The Oregon Department of Environmental Quality has monitored air quality in the Willamette Valley since 1971 by measuring particulate levels in the atmosphere. The number of daily violations of particulate standards that have occurred in cities near the SYUs is shown in Table 2-1. The data indicate that particulate pollution is not a major problem in urban areas.

Table 2-1 Air Quality

Days Exceeding State Particulate Standards[1]

City	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Sandy	0	3	0	0	0	0	0	2	1	NA
Salem	1	0	0	1	0	1	1	0	1	1
Troutdale	1	0	0	0	0	0	NA	NA	NA	NA
Oregon City	9	1	1	0	0	0	1	1	3	0

[1] State standards: 150 micrograms/cubic meter (u/m^3).
Federal standards: 260 u/m^3.

NA - Not available, monitoring discontinued.

Source: Oregon Department of Environmental Quality 1980.

SOILS

Soil associations within the SYUs are shown on the general soils map (Figure 2-1). These soil associations are composed of groups of soils that have similar properties or that frequently occur together. Physical characteristics, interpretations and acreages of these soils are summarized in Appendix G.

Soils within the SYUs are generally capable of producing abundant plant growth. Most have a high content of organic matter, moderate to high nutrient levels and low densities. Soils at high elevations, however, are low in organic matter and nitrogen.

Dry ravelling (see Glossary) of soil materials, mass movement, avalanches and erosion occur naturally throughout the SYUs. Total soil loss from these factors in the undisturbed forest is 0.06 ton per acre per year (ton/ac/yr). Soil loss and loss of soil productivity (see Glossary) have accelerated as a result of timber harvesting, road construction and some silvicultural practices. In areas where road construction and harvest have taken place and regrowth is now established, soil loss is 0.08 to 0.09 ton/ac/yr but is as much as 10 times that amount in areas that have had major disturbances, such as the Quartzville Creek drainage. During the past decade, soil productivity has been lost or severely reduced on an estimated 2,000 acres of BLM-administered land.

The Bureau's TPCC system (see Appendix B) has identified fragile areas based upon factors of slope gradient, ground water, geologic material and soils with low fertility. Table 2-2 shows acres of severely, moderately and slightly fragile areas within the SYUs.

Table 2-2 Fragile Areas Within SYUs

TPCC Factors	Level of Severity (Acres) Severely Fragile	Moderately Fragile	Slightly Fragile	Total
Slope Gradient[1/]	291	87	398	776
Ground Water[2/]	171	32	33	236
Geologic Material[3/]	2,732	23	148	2,903
Low Soil Fertility[4/]	578	2,459	46,575	49,612
Combination[5/]	9,943	6,368	12,492	28,803
Total	13,715	8,969	59,691	82,330

[1/] Slopes greater than 70 percent; highly susceptible to debris torrents, debris avalanches and dry ravelling (see Glossary).

[2/] High water tables; often unable to support commercial stands of trees.

[3/] Rocky soils with a tendency to slide.

[4/] Soils that are gravelly, shallow, deficient in nitrogen, moist for most of the year or highly subject to compaction.

[5/] More than one factor, e.g., rocky soils on steep slopes.

A significant reduction in soil productivity has resulted from disturbing severely and moderately fragile areas.

WATER RESOURCES

The SYUs lie within the Lower and Middle Willamette River Basins. BLM-administered land is drained by approximately 464 miles of second through seventh order streams (see Glossary). These streams flow westward into the Willamette River and northwestward into the Columbia River. Channel gradients vary from greater than 10 percent near headwaters to less than 1 percent in lower valleys. Individual drainages are shown in Figure 2-2. Mean annual water yield from BLM-administered land in the SYUs is estimated to be 897,320 acre-feet. Streamflow data for selected rivers in the SYUs are presented in Water Resources Data for Oregon publications from the U.S. Geological Survey.

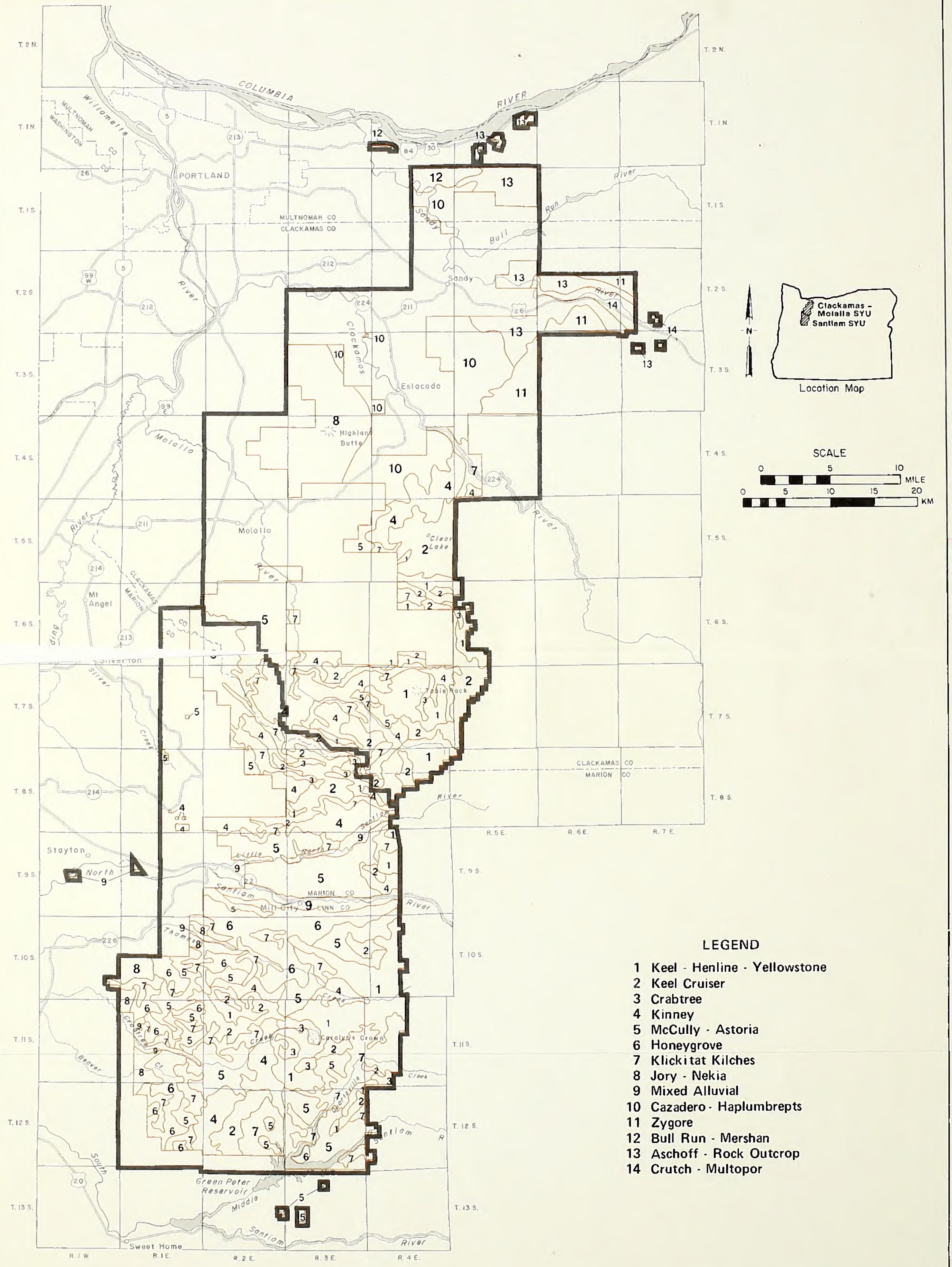
Water for 19 municipal water districts is drawn from 10 streams in all major watersheds in the SYUs. An additional 685 private water rights for domestic, agricultural, industrial and other uses are filed on lands within this area. Concerns about herbicides, bacteria, turbidity, sedimentation and altered water yields have been expressed by several municipal water districts. The percent of BLM-administered land in the SYUs that is included within each district is listed in Table 2-3.

Table 2-3 Municipal Watersheds

Water District	Water Supply Source	BLM Acres in Watershed	Percent BLM 1/
Albany	So. Santiam River	34,304	36
Canby	Molalla River	40,320	36
Clackamas	Clackamas River	14,080	18
Colton	Jackson Creek	530	19
Corbett	Gordon Creek	2,720	24
Estacada	Clackamas River	5,312	7
Gates	No. Santiam River	2,752	3
Lebanon	So. Santiam River	34,304	36
Lyons/Mehama	No. Santiam River	18,944	22
Mill City	No. Santiam River	3,592	4
Milwaukie	Clackamas River	14,080	18
Molalla	Molalla River	36,570	36
Oregon City	Clackamas River	14,080	18
Portland	Bull Run River	70	0.1
Salem	No. Santiam River	18,944	22
Sandy	Alder Creek	480	10
Silverton	Abiqua Creek	1,792	14
Silverton	Silver Creek	200	6
Stayton	No. Santiam River	18,944	22
Sweet Home	So. Santiam River	29,584	36

1/ Percent of watershed in SYUs that is administered by BLM.

Source: USDI, BLM 1980a, 1980b.



LEGEND

1 Keel - Henline - Yellowstone
2 Keel Cruiser
3 Crabtree
4 Kinney
5 McCully - Astoria
6 Honeygrove
7 Klickitat Kilches
8 Jory - Nekia
9 Mixed Alluvial
10 Cazadero - Haplumbrepts
11 Zygore
12 Bull Run - Mershan
13 Aschoff - Rock Outcrop
14 Crutch - Multopor

FIGURE 2-1

GENERAL SOILS

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

CLACKAMAS–MOLALLA and SANTIAM
SUSTAINED YIELD UNITS

Eastside Salem Enviromental Impact Statement Area
1982

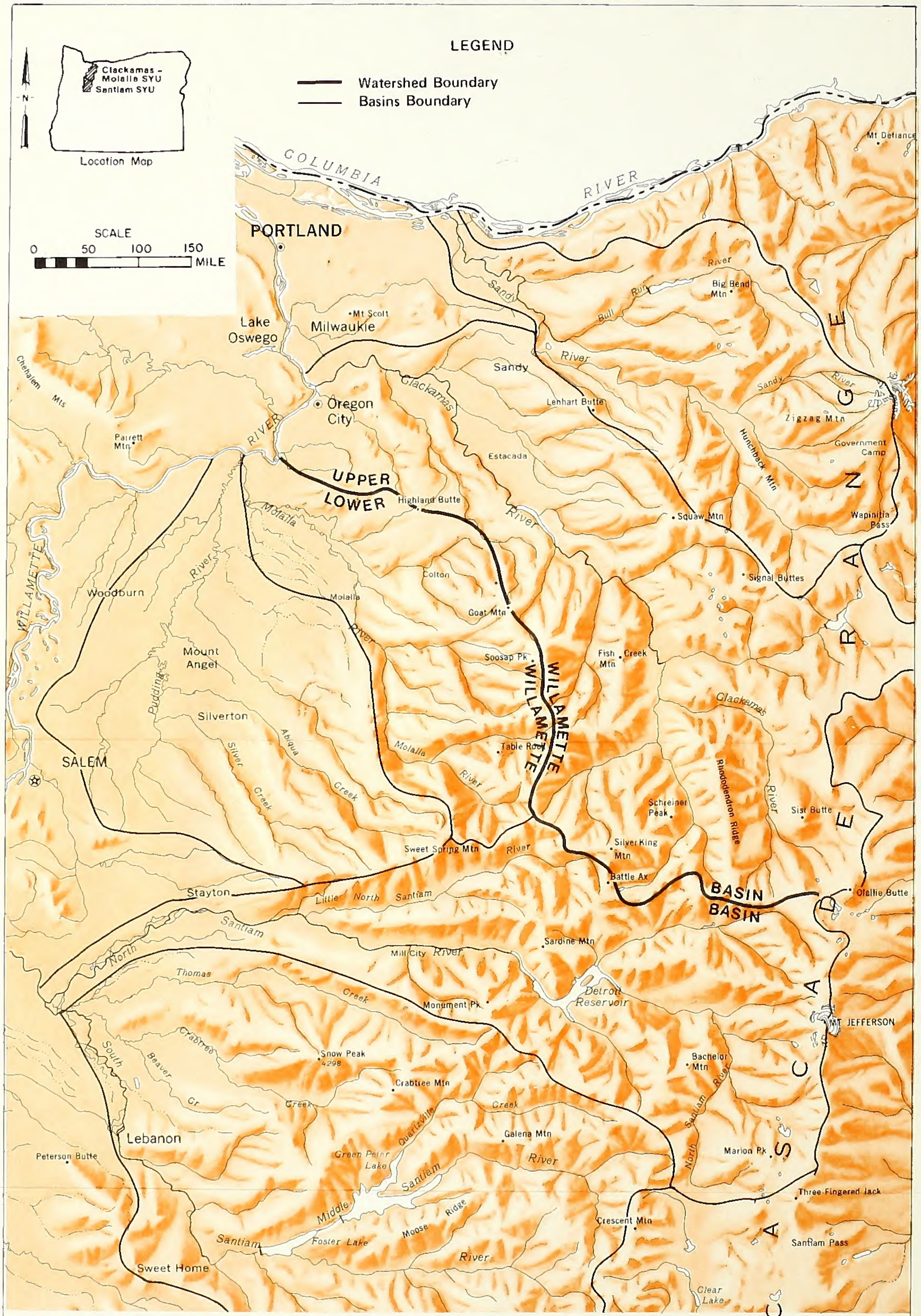


FIGURE 2-2

RELIEF AND MAJOR WATERSHEDS

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

CLACKAMAS-MOLALLA and SANTIAM SUSTAINED YIELD UNITS

Eastside Salem Enviromental Impact Statement Area
1982

The biological and chemical water quality conditions of selected streams were assessed and reported by the Oregon Department of Environmental Quality in 1978. The report showed that most major rivers and some tributary streams within the SYUs had moderate problem ratings with regard to sedimentation and elevated temperatures.

VEGETATION

Terrestrial Vegetation

The SYUs are located in the Northwest Coastal Coniferous Sub-biome (see Glossary). Characteristics of this sub-biome are described in the BLM Timber Management - FEIS (USDI, BLM 1975). For purposes of this EIS, vegetation is generally described in terms of "zones" adapted from those identified by Franklin and Dyrness in Natural Vegetation of Oregon and Washington (1973). A detailed description of each zone and plant community listed below may be found in that source or in reports prepared by Salem District personnel. A complete list of common and scientific names for plants is available upon request.

Portions of three major vegetative zones, Willamette Valley, Western Hemlock, and Subalpine Forests, are found within the SYUs.

The Willamette Valley Zone consists of grassland and prairie, with scattered wood lot groves of conifers and hardwoods. One-tenth of 1 percent of BLM-administered lands in the SYUs is located on the eastern edge of this zone. Major species on BLM land are Douglas-fir, grand fir, bigleaf maple, California hazel, valley oak, ocean spray and swordfern.

The Western Hemlock Zone extends from the eastern edge of the Willamette Valley Zone to the western edge of the Subalpine Forest Zone. It ranges in elevation from near sea level in the Columbia Gorge to 3,250 feet in other areas. The Western Hemlock Zone encompasses 99.3 percent of BLM-administered lands in the SYUs. Six major plant communities with various associations of trees, shrubs and forbs are found in the zone.

Associations vary according to specific conditions such as aspect, moisture, soil type and soil depth. Communities, listed from driest to wettest, are:

a. Douglas-fir, ocean spray
b. Western hemlock, golden chinkapin
c. Western hemlock, Pacific rhododendron, salal
d. Western hemlock, Pacific rhododendron, Oregon grape
e. Western hemlock, swordfern, Oregon oxalis
f. Western redcedar, western maidenhair fern, ladyfern

Douglas-fir, a subclimax species, is often the dominant tree in the hemlock zone. As a pioneer species, Douglas-fir theoretically constitutes a seral (successional) stage (See Glossary) in the development of the vegetative community.

Less than 1 percent of the SYUs (district lands above 3,000 feet) is in the Subalpine Forest Zone. This zone is divided into Pacific silver fir, subalpine fir and mountain hemlock sub-zones, all occurring on BLM-administered land. Plant communities of wet and cool micro-climates exist in association with the tree species of this zone.

Riparian vegetation occupies the transitional areas from poorly drained streambanks to better drained slopes. Vegetation in these areas ranges from a few aquatic species and the hardwood-western redcedar-hemlock type, to the predominant Douglas-fir stand usually found on slopes.

Vegetation stratification for BLM-administered land and all forested land on the west slope of the Cascades in northern Oregon is depicted in Table 2-4.

Table 2-4 Existing Forest Vegetation Stratification of Western Cascades[1] (Acres)

Forest Vegetation	BLM	All Lands
Grass/Forb (non-stocked and 0-7 years)	16,200	253,600
Brush/Seedling (8-15 years)	9,100	191,100
Pole/Sapling (16-45 years)	32,100	540,000
Young Second Growth (46-115 years)	47,100	413,100
Mature (116-195 years)	10,900	188,900
Old Growth[2] (196+ years)	27,300	441,000
Hardwoods	5,300	--

[1] 2,028,000 acres of private, State and Federal forest lands within Clackamas, Linn, Marion and Multnomah counties. The region includes all lands east of the Willamette River, west of the Cascade crest, north of the Lane County line and south of the Columbia River.

[2] Does not include younger stands with scattered old growth.

Source: USDI, BLM; USDA, FS; Oregon State Department of Forestry; Oregon State Department of Transportation (Parks and Recreation Branch).

Wetland and Aquatic Vegetation

Wetlands are areas inundated by surface or ground water frequently enough to produce a saturated or seasonally-saturated soil condition. Examples of wetlands are marshes, swamps, bogs, wet meadows and natural ponds. Sedges, grasses, rushes, skunk cabbage, cattails and algae are typical wetland plants.

Sensitive, Threatened and Endangered Plants

Endangered plants are those species considered in danger of extinction throughout all or a significant portion of their range. Threatened plants are not endangered but are likely to become so within the foreseeable future throughout all or a significant portion of their range. Sensitive plants (see Glossary) are not officially listed, but their status is under review.

Botanical surveys for sensitive, threatened and endangered plants have been conducted on the Salem District since 1977. A number of plants currently listed as sensitive by the Oregon State Land Board have been identified within the SYUs (see Appendix H). Some of these sensitive plants are protected under a policy adopted by the Salem District Manager in concurrence with the Oregon State Director. At present, no Federally-listed threatened or endangered plants are known to exist in the SYUs. However, several species observed in the SYUs are currently under review by the U.S. Fish and Wildlife Service for listing as threatened or endangered (see Appendix H). The final status of these species will be determined as sufficient data are collected. In the interim, they will be protected from management activities likely to jeopardize their survival on BLM-administered lands.

ANIMALS

Terrestrial Animals

Vertebrate animal species within the SYUs total 65 mammals, 232 birds, 14 reptiles and 18 amphibians (see Appendix E). Each of these species adapts to a specific set of habitat conditions found within plant communities and their successional stages. The variety of habitats, each with unique structure, accounts for the diversity of animals in the SYUs.

Successional stages of plant communities in western Oregon normally progress toward the climax western hemlock forest. Different animal species occur in these various successional stages, although individual species may exist in several stages. Natural or artificial influences, such as fire and logging, can set succession back to an earlier stage. As a result, species requiring older stages are replaced by species adapted to earlier stages. For example, clearcutting of old-growth and mature coniferous forests eliminates habitat for species such as the northern spotted owl, red tree vole and northern flying squirrel while creating habitat for species like the white-crowned sparrow, dark-eyed junco and brush rabbit.

Throughout most of the SYUs, mature and old-growth forests have been converted to earlier successional stages, primarily by timber harvesting. The preponderance of young forest stands (less than 116 years old) has resulted in a trend toward reduced habitat and animal diversity.

An estimate of habitat structure for all private, State and Federal forest lands within the entire Western Cascades area is displayed in Table 2-5. Bureau forest lands comprise 7.9 percent of this total. The table indicates that forest structure in the entire area is skewed toward earlier stages.

Table 2-5 Habitat Structure of Forest Lands
in the Western Cascades 1/ (by percent)

Habitat Type	All Lands1/	BLM2/	BLM Habitat as a Percent of All Forest Lands3/
Grass/Forb (non-stocked and 0-7 years)	13	11	6
Brush/Seedling (8-15 years)	9	6	5
Pole/Sapling (16-45 years)	27	25	6
Young 2nd Growth (46-115 years)	20	32	11
Mature (116-195 years)	9	7	6
Old Growth (196+ years)	22	19	6

1/ 2,028,000 acres of private, State and Federal forest lands within Clackamas, Linn, Marion and Multnomah counties.

2/ 148,000 acres of forest land.

3/ This column indicates, for example, that while 19 percent of BLM-administered land is old growth, this is 6 percent of all old growth in the Western Cascades.

Source: USDI, BLM; USDA, FS; Oregon Department of Forestry.

Table 2-6 lists amount, condition and trend of wildlife habitat on BLM-administered land. Habitat condition ratings reflect the composite effects of three factors: composition, distribution and integrity (for individual ratings of each factor see Appendix I). Composition refers to the mix of habitat types in the SYUs. Good composition is defined as a diverse mixture of all potential habitat types. A good rating is given if existing composition closely approximates the best potential composition as determined by western Oregon BLM biologists (see USDI, BLM 1980c). Distribution refers to spacing or location of habitat types throughout the SYUs. In general, an even distribution of habitat types would provide the best situation for wildlife by providing greater edge area and opportunity for genetic transfer between animals. In contrast, an uneven distribution, where large areas would be dominated by a single habitat type, would adversely affect wildlife. Integrity refers to the amount of disruption to natural processes within habitat types. Good ratings reflect minimum disruption by intensive practices such as thinning, salvage, slash burning and herbicide application.

Table 2-6 Amount, Condition and Trend of BLM-Administered Habitat

Habitat Type	Acres	Condition 1/	Trend 1/
Conifer Forest			
Grass/Forb (NS 2/ /0-7 years)	16,200	Poor	Improving
Brush/Seedling (8-15 years)	9,100	Poor	Improving
Pole/Sapling (16-45 years)	32,100	Good	Improving
Young 2nd Growth (46-115 years)	47,100	Good	Improving
Mature (116-195 years)	10,900	Good	Declining
Old Growth (196+ years)	27,300	Good	Declining
Hardwoods	5,300	Poor	Stable
Riparian	9,400 3/	Poor	Declining
Snags	--	Poor	Declining

1/ Reflects quality and quantity of habitat.

2/ Non-stocked.

3/ Acres included in other habitat types.

Source: Salem District personnel.

The reduction of old growth represents the most serious problem for wildlife in the SYUs. Approximately 62 wildlife species find their optimum habitat in old-growth and mature forests (see Appendix E). Projections indicate that 10-20 percent of Federal forest lands will be old growth by the year 2000

(USDA Forest Service 1963). Most old growth on private lands has been eliminated. Reduced abundance of the northern spotted owl has been attributed to the decline of old-growth habitat (Forsman 1975).

Other habitat types in the SYUs have also been altered by forest harvesting. Some of these are relatively scarce within the SYUs. These habitats include: snags, riparian zones, dry meadows, wetlands and talus slope/cliffs.

Snags are of special concern, since they provide optimum habitat for 49 species and are used to some extent by 36 other species of birds and mammals in the SYUs (see Appendix E). Cavity-nesting birds feed on insects and play an important role in control of forest insect pests (Thomas 1979). Under natural conditions, snags occur throughout the forest as a result of fire, disease and other factors. However, current safety and fire prevention measures have resulted in the removal of many snags in the SYUs. Recent snag surveys by district personnel revealed an average of 0.26 snags per acre on coniferous forest lands under BLM administration. At this level, primary excavators (see Glossary) are at 10 percent of potential population levels.

Riparian zones (see Glossary) are also of special importance. Approximately 155 species of wildlife find their optimum habitat in these zones (see Appendix E). Timber harvesting on BLM-administered land has modified riparian habitat on many second through fifth order and some larger streams. The importance of riparian zones as wildlife habitat is described by Thomas (1979).

Fish

The SYUs lie within the Willamette River and Columbia River drainages, areas extremely rich in anadromous fish habitat (see Glossary).

Habitat conditions have been degraded by past logging activities, road construction, mining, dams and improperly installed culverts. As a result of improved timber management practices, reestablishment of vegetation, cessation of mining and better fish passage facilities, overall condition and use of fish habitat have recently improved. Streams are considered to have a specific carrying capacity for salmonids, producing similar annual numbers of young, provided habitats are not degraded and stocks have not been overfished (Allen 1969; McFadden 1969). Streams in the SYUs are currently producing at an estimated 57 percent of potential for native salmonids. Table 2-7 shows habitat conditions and population trends for salmon and trout.

Game fish consisting of five species of salmonids, American shad, mountain whitefish and several warm water species use habitat in the SYUs. Chinook salmon, found in larger streams, are increasing in numbers with the establishment of fall runs and are nearing recent historical averages in abundance. Steelhead trout populations are increasing in numbers due to the establishment of summer runs and are above recent historical averages. Cutthroat trout, both resident and sea-run, are found at moderate levels. Moderate to high numbers of hatchery-reared rainbow trout are annually stocked in major rivers, Green Peter Reservoir and some small ponds. Sockeye salmon, found only in the South Fork Santiam drainage, are at low population levels. Moderate numbers of American shad, mountain whitefish and warm water game fish are found in larger streams.

Special concern has been expressed for the Coho salmon, whose population levels are depressed and declining. Because of its importance to the sport and commercial fishery, efforts are being made by State and Federal agencies to rehabilitate Coho salmon runs.

Table 2-7 Cold Water Fish Habitat and Populations [1]

Species	Stream Miles	Condition of Habitat[2] Exc. (%)	Good (%)	Fair (%)	Poor (%)	Habitat Trend	Current Population	Population Trend
Cutthroat	156.9	14	50	30	6	Stable	Moderate	Declining
Steelhead	63.5	12	57	29	2	Stable	Moderate	Increasing[3]
Chinook	30.5	10	55	31	4	Stable	Moderate	Increasing[3]
Coho	30.6	15	56	27	2	Stable	Low	Declining
Sockeye	7.1	--	8	92	--	Stable	Low	Stable

[1] Habitat miles, condition and trend are for BLM-administered lands only.

[2] Streams in excellent condition have riparian vegetation (see Glossary), abundant and diverse instream structure (see Glossary), numerous high quality pools, sediment-free bottom substrate, adequate spawning gravels and stable banks and channels. Streams in good to poor condition lack one or more of these characteristics.

[3] Due primarily to hatchery releases.

Source: USDI, BLM 1980a.

Many other species of fish are present in the SYUs including sculpins, suckers, dace, squawfish and shiners. Population data for these species are scarce. None are of direct commercial or sport value although some species may be eaten by trout and salmon and/or compete with game fish for food and space.

Threatened and Endangered Animals

Four species of animals, officially listed by the U.S. Fish and Wildlife Service and/or the State of Oregon as threatened or endangered, occur at least occasionally in the SYUs. Species and their status are as follows:

Threatened and Endangered Species in the SYUs	Federal Status	Oregon Status
Northern bald eagle *Haliaeetus leucocephalus alascanus*	T	T
Peregrine falcon *Falco peregrinus*	E	E
Northern spotted owl *Strix occidentalis caurina*		T
Western spotted frog *Rana pretiosa*		T

T = Threatened E = Endangered

The northern bald eagle is not known to nest on BLM-administered lands in the SYUs. Although several eagles have been seen overwintering near Green Peter Reservoir, no communal roosting sites have been found on BLM-administered land in the SYUs.

The peregrine falcon is not known to nest in the SYUs. There are no recent sightings and no historical records of breeding locations.

The northern spotted owl breeds in old-growth habitat throughout the SYUs, and 34 owl locations have been found on BLM-administered lands within this area. Of the 34 locations known to have supported owls at some time in the last six years, 29 currently have habitat that is of at least marginal quality; five have been so altered that they will not support owls. Of the remaining 29 locations, 16 were occupied during 1981. Habitat conditions at these locations are shown in Table 2-8.

Table 2-8 Habitat Conditions at Northern Spotted Owl Locations

Habitat Conditions	Locations	Locations Occupied in 1981
Poor	12	2
Fair	3	3
Good	4	4
Very Good	10	7
Excellent	0	0

Poor = Less than 150 acres of old growth within 1,200 acres. Habitat is extremely marginal and will eventually fail to support owls.

Fair = 150-300 acres of old growth within 1,200 acres. Habitat is extremely marginal and will eventually fail to support owls.

Good = 300-450 acres of old growth within 1,200 acres.

Very Good = More than 450 acres of old growth within 1,200 acres.

Excellent = More than 450 acres of old growth within 1,200 acres; old growth of excellent quality, in large blocks, with no intrusions.

Source: Salem District biologists.

Although not on the Federal list of threatened and endangered species, the northern spotted owl is on the State of Oregon list of threatened species. As old-growth coniferous forest continues to decline in western Oregon, the spotted owl may become a candidate for Federal listing.

The western spotted frog has been displaced from most of its former habitat in western Oregon by the introduced bullfrog. No spotted frogs have been found on BLM-administered lands in the SYUs.

To date, the U.S. Fish and Wildlife Service has not designated any critical habitat (see Glossary) within the SYUs under authority of Section 4 of the Endangered Species Act of 1973.

RECREATION

The forested environment, numerous roads and remaining undisturbed areas in the SYUs provide a wide variety of recreation opportunities, including camping, picnicking, fishing, hunting and sightseeing. Table 2-9 summarizes visitation for major recreation activities in the SYUs.

Table 2-9 Estimated Recreation Visitor Days

Activity	1975 Visitor Days Total	 BLM
Camping (developed site)	1,529,600	13,000
Picnicking (developed site)	4,187,900	63,000
Camping (dispersed)	509,900	31,000
Picnicking (dispersed)	1,396,000	64,000
Hunting (big game)	171,800	8,700
Hunting (upland game)	101,300	1,700
Fishing (salmon)	140,000	5,300[1]
Fishing (steelhead)	61,100	2,000[2]
Fishing (other)	396,200	15,100
Other Day Uses	68,734,700[3]	105,000[4]
Total	77,227,900	308,800

[1] Includes ocean sport fishing for salmon reared in BLM-managed streams.

[2] Includes downstream fishing for steelhead reared in BLM-managed streams.

[3] Total area day use visitation includes urban and semi-urban activities. This use is not generally associated with BLM-administered lands.

[4] Includes sightseeing.

Source: USDI, BLM 1980b.

Sightseeing is the major activity on BLM-administered land and the most widespread. Some higher-quality sightseeing areas are the Columbia River Gorge, Sandy River Gorge, Table Rock and Rock Corral.

Fishing and hunting are also major recreation pursuits. Some of the best hunting areas are the Molalla River and North Santiam River drainages for upland game; Larch Mountain-Sandy River area for bear; and the upper Molalla River drainage for deer. Resident trout and winter steelhead provide excellent fishing in some streams. Fishing for spring and fall chinook salmon, summer steelhead, sea-run cutthroat and mountain whitefish is rated good. North Fork Reservoir and Green Peter Reservoir provide good to excellent bank and boat angling.

Dense vegetation and steep terrain generally limit off-road vehicle (ORV) use to existing roads and trails. Areas receiving most use include the Butte Creek-Fall Creek area and the Lacomb-Green Mountain area.

Recreation trails administered by BLM are Angel's Rest, Baty Butte/Silver King, Eagle Creek, Nasty Rock and Table Rock. A 7-mile segment of the Table Rock Trail system is a potential candidate for nomination as a national recreation trail. Columbia River Gorge, Elkhorn Creek, Green Peter Peninsula and Quartzville Creek-Crabtree Mountain areas are potential locations for BLM trails.

BLM administers seven developed recreation sites (see Glossary): North Fork Eagle Creek, Wildwood, Elkhorn Valley, Canyon Creek, Fishermen's Bend, Dogwood and Yellowbottom (see Fig. 1-1). Wildwood is a large day-use development with facilities for individuals, families and organized groups. Fishermen's Bend provides camping and day-use facilities adjacent to Highway 22, a major east-west route. Use of Wildwood and Fishermen's Bend is high, and is light to moderate at other developed sites. Five locations identified for possible future development by BLM are Green Peter Peninsula, Little Meadows, Sinker Creek, Salmon Falls and Table Rock Fork/Molalla River. County parks located partially on lands leased by BLM are Sandy Oxbow and North Fork Parks. Opportunities for dispersed camping and picnicking are available throughout the SYUs.

The Table Rock and Green Peter Peninsula/Quartzville Creek areas have been identified as potential Recreation Lands, a designation which may be applied to large areas with exceptional recreation values and high potential for recreation use (43 CFR 2070). The 6,350-acre Table Rock area was proposed on the basis of its unroaded character, 10-mile ridge trail system, outstanding scenic qualities and proximity to Willamette Valley population centers. The 7,260-acre Green Peter Peninsula/Quartzville Creek area was proposed for its water-based recreation opportunities. Recreation developments, which now consist of two recreation sites on Quartzville Creek, could be increased to provide fishing, boating and camping accommodations on the peninsula.

Three areas (see Table 2-11) are proposed for Outstanding Natural Area status (see Glossary). Each has high scenic quality and provides excellent recreation opportunities. The Sandy River Gorge proposal consists of three parcels of BLM-administered land within a State Scenic Waterway. The Table Rock proposal is situated within the potential Table Rock Recreation Lands. The Soosap Meadows area is proposed for its values associated with Cascadian subalpine meadows in an undeveloped forest setting.

Phase I of the Nationwide Rivers Inventory conducted by the National Park Service has identified three potential scenic or recreational rivers crossing public land within the SYUs (see Table 2-10).

Table 2-10 Rivers Identified in the Nationwide Rivers Inventory

River	Approx. Shoreline Mileage Total Length	 Total BLM	Approx. Corridor Acreage[1/] Total	 Total BLM
Salmon	25.6	2.0	8,192	608
Clackamas	53.5	1.2	17,120	618
North Santiam	17.6	0.8	5,632	282

[1/] Total corridor width is one-half mile (one-quarter mile on each side of the river).

Source: USDI, Heritage Conservation and Recreation Service 1980; Salem District personnel.

Segments of the Sandy and Clackamas Rivers are designated Oregon State Scenic Waterways. Rivers identified as potential Oregon State Scenic Waterways within the SYUs are the North Santiam, South Santiam and Salmon.

CULTURAL RESOURCES

Federal agencies have been charged with responsibility for cultural resources (see Glossary) on lands under their jurisdiction. Through a group of laws beginning with the Antiquities Act (1906), BLM has been mandated to identify, protect and enhance such resources on public lands. A number of procedures, including those specified in 36 CFR 800.4(a), were used to identify the cultural resources within the SYUs.

A survey of existing cultural resource information (Class I inventory) has been completed for the SYUs (Minor et al. 1980) and is available in the Salem District Office. All recorded cultural sites were identified through a compilation of the area's existing site record data.

The criteria used to assess the eligibility of identified cultural resources for inclusion in the National Register of Historic Places are described in 36 CFR 1202.6. The BLM also employs a cultural resource evaluation system to assess the relative value of a cultural site in terms of possible uses.

Archeological Sites

Forty-two prehistoric archeological sites have been identified within the SYUs. Some information has been lost from all of these sites as a result of natural or human disturbances prior to discovery. Future intensive surveys will certainly result in the location of many additional sites, though it is unlikely that sites will be found in very dense concentrations.

While most of the major settlements during prehistoric times were located in the Willamette Valley, a considerable number of related subsistence activities took place in the adjacent uplands. The SYUs were used for hunting animals and gathering plant foods and raw materials. They were also crossed by an extensive network of trails serving as trade and travel routes for groups on both sides of the Cascades. Archeological evidence indicates that humans have been using parts of the western Cascades for at least 8,000 years.

Most of the identified sites in the SYUs were probably seasonal campsites. Sites of this nature are likely to be located on relatively level ground such as benches, meadows, saddles and ridgetops. Trails were primarily confined to ridgelines and the larger river valleys. In most of the SYUs, steep terrain and dense vegetation discouraged habitation, though such sites as rock shelters, rock art and spirit quest places might be encountered in any part of the SYUs.

None of the archeological sites within the SYUs are listed on the National Register of Historic Places (see Glossary), but the Table Rock Trail and two associated archeological sites have been determined eligible for inclusion.

Historic Sites

There are 115 inventoried historic sites on or near BLM-administered land within the SYUs. Of these, 88 are documented in historical records but remain unverified in the field. Most historic sites relate to settlement, transportation, mining and logging. All known historic sites have deteriorated to some extent from natural weathering and/or human disturbance.

Two historic sites within the SYUs are listed on the National Register of Historic Places. These consist of 0.2 mile of the Barlow Road (South Alternate) and Rock Corral, a campsite beside the Barlow Road.

Historic sites are protected by the same stipulations as archeological sites, and a thorough survey to identify them so they can be protected is accomplished prior to ground disturbance or ownership changes. The results of this intensive survey are documented in each site-specific environmental assessment.

Paleontological Sites

Several deposits of petrified wood, two fossil leaf sites and two deposits of fossilized clam shells have been identified within the SYUs. Some unique fossil wood sites occur along Thomas Creek (Eubanks 1960), and scattered specimens may exist on BLM-administered land in that drainage.

All reports of fossil-bearing deposits are examined by qualified personnel to avoid destruction of those which may be important.

VISUAL RESOURCES

Visual resources are the land, water, vegetation, animals and other features (as described in this chapter) visible on public lands. Since visual resource values are to be considered when planning timber management activities, all public lands have been assigned visual resource management (VRM) classes according to scenic quality, sensitivity level and distance zone criteria (see Glossary). These classes provide VRM objectives designed to mitigate and, in some situations, avoid the adverse impacts of management activities on scenic values (BLM Manual 8400). Figure 2-3 shows VRM classes derived from an inventory and evaluation of the landscape in the SYUs. Acreages of each class are listed in Table 3-14, (Existing Situation column).

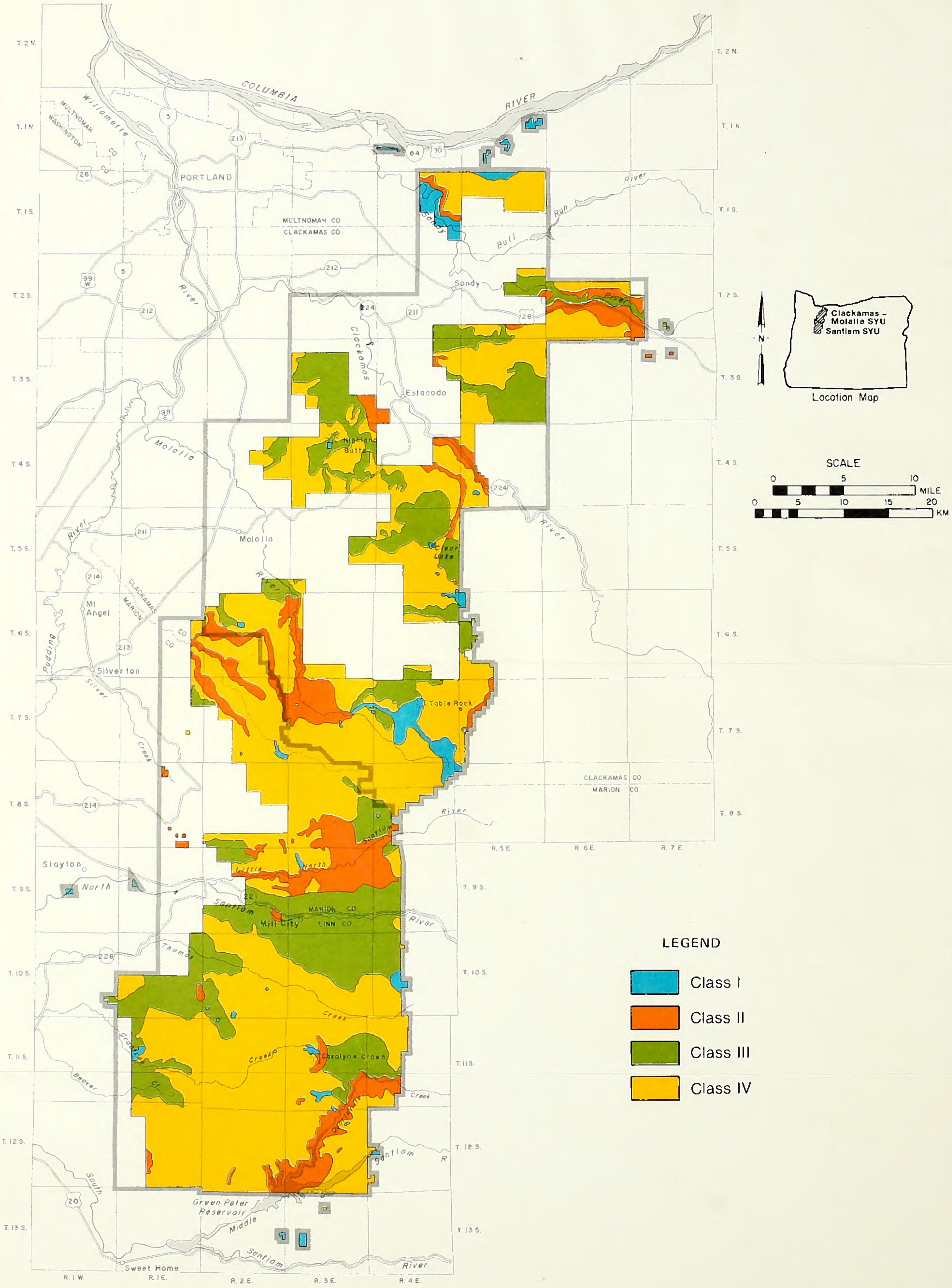


FIGURE 2-3

VISUAL RESOURCE MANAGEMENT CLASSES

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

CLACKAMAS–MOLALLA and SANTIAM SUSTAINED YIELD UNITS

Eastside Salem Enviromental Impact Statement Area
1982

The VRM classes, objectives and general class standards are:

Class I: Provides primarily for natural ecological change and preservation of scenic quality (highest level of protection). This class generally includes areas with high scenic qualities and/or high sensitivity levels.

Class II: Landscape alterations caused by management activities should not be evident in the characteristic landscape (see Glossary), and scenic quality should be retained. Changes may be seen but should not attract attention. This class generally includes areas with high to moderate scenic qualities and high sensitivity levels.

Class III: Alterations may be evident in, but should remain subordinate to, the characteristic landscape, and scenic quality may be partially retained. This class generally includes areas with moderate to low scenic qualities and high to medium sensitivity levels.

Class IV: Alterations may attract attention and dominate the view but should blend with the characteristic landscape. Scenic quality may be modified (lowest level of protection). This class generally includes areas with low scenic qualities and medium to low sensitivity levels.

Of all BLM-administered land in the SYUs, approximately 5 percent is Class I, 15 percent Class II, 25 percent Class III and 55 percent Class IV. Some Class I areas are the Sandy River Gorge, Highland Butte, Table Rock, Buzzard Butte, Yellowstone Creek and more than 30 waterfalls. Class II areas include BLM-administered lands seen from Mt. Hood Highway 26, Clackamas River Highway 224, Little North Santiam River Road and Quartzville Access Road.

WILDERNESS VALUES

Under the terms of the Federal Land Policy and Management Act of 1976 (FLPMA), roadless areas of 5,000 acres or more with wilderness characteristics are to be reviewed within 15 years for possible wilderness designation. FLPMA also states that in the event of conflict with or inconsistency between its provisions and those of the O&C Act as they relate to management of timber resources, the O&C Act shall prevail. Accordingly, the wilderness review provisions of FLPMA do not apply to O&C lands suitable for sustained yield management as commercial timberlands. No areas within the SYUs are proposed wilderness study areas.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Areas of Critical Environmental Concern (ACECs) are areas on BLM-administered lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards (FLPMA section 103(a)). Designation of an area as an ACEC does not necessarily preclude development but rather ensures the protection of sensitive values in those cases where appropriate development may take place. Prior to designation, site-specific management prescriptions are developed for each potential ACEC. Following designation, activity plans are prepared to translate the special management requirements into on-the-ground actions.

Table 2-11 Nominated and Potential Areas of Critical Environmental Concern

Site Name	Approximate Size (acres)	Description[1]	Primary Resource Value	Remarks
Potential ACEC's				
1. Columbia River Gorge (Mult. Co.)	900	High quality scenic area; sensitive and relict plants.	Scenic, Botanical	
2. Sandy River Gorge (Mult.-Clack. Co.)	380	Within State Scenic Waterway; rare type of old-growth Douglas-fir forest.	Scenic, Botanical	Proposed Outstanding Natural Area (see Glossary)
3. Williams Lake (Clack. Co.)	90	Fine example of bog/quaking bog succession; unique plant community.	Botanical	
4. Soosap Meadows (Clack. Co.)	400	Cascadian subalpine meadow; sensitive plant species.	Scenic, Botanical	Proposed Outstanding Natural Area
5. Table Rock (Clack. Co.)	5,400	High quality sightseeing opportunities; sensitive plants; historic trail.	Scenic, Botanical, Cultural	Portion (1,745 acres) is proposed Outstanding Natural Area
6. Carolyn's Crown (Linn Co.)	260	Rare example of old-growth coniferous climax forest; glaciated cirque; sensitive plant species, glaciation phase plant ecology.	Botanical	Proposed Research Natural Area (see Glossary)
7. Middle Santiam Terrace (Linn Co.)	80	Douglas-fir-western hemlock climax forest; sensitive plant species.	Botanical	
Nominated But Not Qualified for ACEC Designation[2]				
1. Shafer Creek (Linn Co.)	240	Relict vegetation; old-growth coniferous near-climax forest.	Botanical	
2. Snow Peak (Linn Co.)	2,400	Unique glaciated shield volcano.	Geological	Proposed Educational and Scientific Study Area (see Glossary)

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[1] See USDI, BLM 1981b for more detailed descriptions.

[2] Two identification criteria (relevance and importance) derived from the Federal Land Policy and Management Act (1976) were applied to evaluate all areas nominated for ACEC designation. Areas nominated but not qualified for designation failed to meet these criteria as described in the August 1980 Final Guidelines for Areas of Critical Environmental Concern (USDI, BLM 1980d).

Nine areas were nominated for ACEC consideration during the Eastside Salem District planning process (see Table 2-11). Seven of these meet the criteria of relevance and importance and thus have potential for designation. The decision to designate any or all of these seven areas as ACECs will be part of the MFP decision for the SYUs, to be made following completion of this EIS. Some of the potential ACECs are also being considered for other protective designations (see Table 2-11).

SOCIOECONOMIC CONDITIONS

Public lands in the SYUs are located entirely within the four counties identified in Table 2-12. These counties, for the socioeconomic discussion, are termed the EIS area.

The EIS area lies mostly between the Willamette River on the west and the Cascade Mountains on the east. The large population (Table 2-12), which includes major portions of the Portland and Salem metropolitan concentrations, is located mainly along the Willamette. A few towns dependent on timber production exist in areas remote from the main population.

The population of the area has grown about 35 percent during the past two decades. Population growth has been greatest in Clackamas and Marion Counties.

Table 2-12 Population, 1960-1980

County	1960	1970	1980	Annual Growth Rate 1960-70	Annual Growth Rate 1970-80
Clackamas	113,038	166,088	241,919	3.9%	3.8%
Linn	58,867	71,914	89,495	2.0	2.2
Marion	120,888	151,309	204,692	2.3	3.1
Multnomah	522,813	556,667	562,640	0.6	0.1
Total	815,606	945,978	1,098,746	1.5%	1.5%

Source: U.S. Department of Commerce, Bureau of Census 1960-1980.

Personal income and labor and proprietors' income are shown in Table 2-13. Personal income is a measure of the economic welfare of the residents of an area and is generally considered to be closely related to their social well-being. Labor and proprietors' income, which represents worker earnings, is shown here as the basis for later calculations of the effect of changes in production on income. Per capita personal income for the area as a whole was above the State average in all years shown because of above average income levels in Multnomah and Clackamas Counties. Per capita income growth in the area as a whole was greater than the inflation in the Portland Consumer Price Index during the period. The two counties with the slowest population growth (Multnomah and Linn) had the largest per capita income increases.

Estimates of earnings per worker in all industries and the timber industry have been calculated by dividing total covered payrolls by average employment

(Oregon Department of Human Resources 1981). Earnings per worker in 1979 for all industries and for the timber industry (including pulp, paper and board) were as follows:

County	All Industries	Timber
Clackamas	$13,242	$20,193
Linn	13,971	18,521
Marion	11,888	16,878
Multnomah	14,251	19,984

Table 2-13 Personal Income and Labor and Proprietors' Income, 1975-1979

County	1975	1976	1977	1978	1979
Total Personal Income (in thousands)					
Clackamas	$1,202,076	$1,376,024	$1,600,180	$1,875,648	$ 2,156,985
Linn	392,088	460,355	542,003	610,488	676,680
Marion	945,051	1,085,385	1,267,412	1,452,781	1,649,524
Multnomah	3,765,275	4,147,120	4,582,822	5,207,274	5,878,983
Total	$6,304,490	$7,068,884	$7,992,417	$9,146,191	$10,362,172
Total Labor and Proprietors' Income (in thousands)1/					
Clackamas	$ 547,154	$ 639,331	$ 767,483	$ 923,996	$ 1,098,004
Linn	316,062	376,781	443,770	500,215	549,106
Marion	698,987	812,741	962,471	1,107,881	1,254,553
Multnomah	3,790,946	4,199,030	4,686,586	5,388,883	6,052,745
Total	$5,353,149	$6,027,883	$6,860,310	$7,920,975	$ 8,954,408
Per Capita Personal Income (in dollars)					
Clackamas	$5,963	$6,650	$7,340	$8,189	$9,063
Linn	4,872	5,575	6,407	7,064	7,554
Marion	5,699	6,299	7,195	7,936	8,760
Multnomah	6,917	7,627	8,680	9,913	10,962
Area Average	$6,353	$7,034	$7,940	$8,934	$9,848
State Average	$5,764	$6,419	$7,176	$8,078	$8,887

1/ Labor and proprietors' income is presented here by place of work in contrast to the personal income data which are by place of residence. It is representative of work force earnings only and excludes dividends, interest, rents and transfer payments which are included in personal income.

Source: U.S. Department of Commerce, Bureau of Economic Analysis 1981.

Table 2-14 shows covered employment averaged over the period 1976-1980. (Covered employment is employment covered by the unemployment compensation law and represents about 80-85 percent of total employment.) Timber production constitutes about 22 percent of manufacturing employment in the EIS area and about 4 percent of total covered employment. Omitting Multnomah County, timber industry employment represents 40 percent of manufacturing employment in the remaining three counties.

Table 2-14 Average Covered Employment, 1976-80
(Number of workers)

	Clackamas	Linn	Marion	Multnomah	EIS Area
Total	53,736	28,507	71,908	316,528	470,679
Manufacturing	13,066	11,175	10,941	53,262	88,444
Timber	4,387	6,626	3,073	5,803	19,889
Lumber & wood products	2,618	5,488	2,248	3,750	14,104
Pulp, paper & board	1,769	1,138	825	2,053	5,785
Non-manufacturing	40,670	17,332	60,967	263,266	382,235

Source: Oregon Department of Human Resources, Employment Division 1980, 1981.

Unemployment measures for individual counties in Standard Metropolitan Statistical Areas (SMSA) are not available on an official basis, but unemployment levels in local communities do tend toward the average level in their metropolitan area. Figure 2-4 shows how fluctuations in timber industry employment and overall unemployment levels have been related during the period 1975-1980. The downturn in timber employment in 1980 accelerated the rise in unemployment. Unemployment rates in 1981 remain high.

Timber Industry

The economic importance of the timber industry to the counties in the EIS area is shown in Table 2-15. Workers' earnings which are spent locally generate additional local income. The process by which additional income is created through successive rounds of expenditures following the initial receipt of income by a specific economic sector is called a multiplier effect. Estimates of the total income (earnings) generated in local areas due to the multiplier effect on workers' earnings in the timber industry are shown in the table. These earnings estimates were divided by average earnings per worker to estimate the total employment generated.

Earnings and employment generated by BLM harvests in the timber industry and in the local area overall are shown in Table 2-16. The estimates are based on harvest data for the years 1976-1978. Timber cut from BLM-administered lands provides employment in the timber industry at three stages: when timber is logged, when logs are manufactured into wood products, and when logs, wood chips and other residues from lumber and plywood mills are made into pulp, paper and board. Employment estimates for these three elements are displayed in Table 2-16.

According to these estimates, timber industry activity generated by BLM harvests amounts to about 4 percent of timber industry employment and accounts for about 0.4 percent of the total earnings of labor and proprietors in the four-county area.

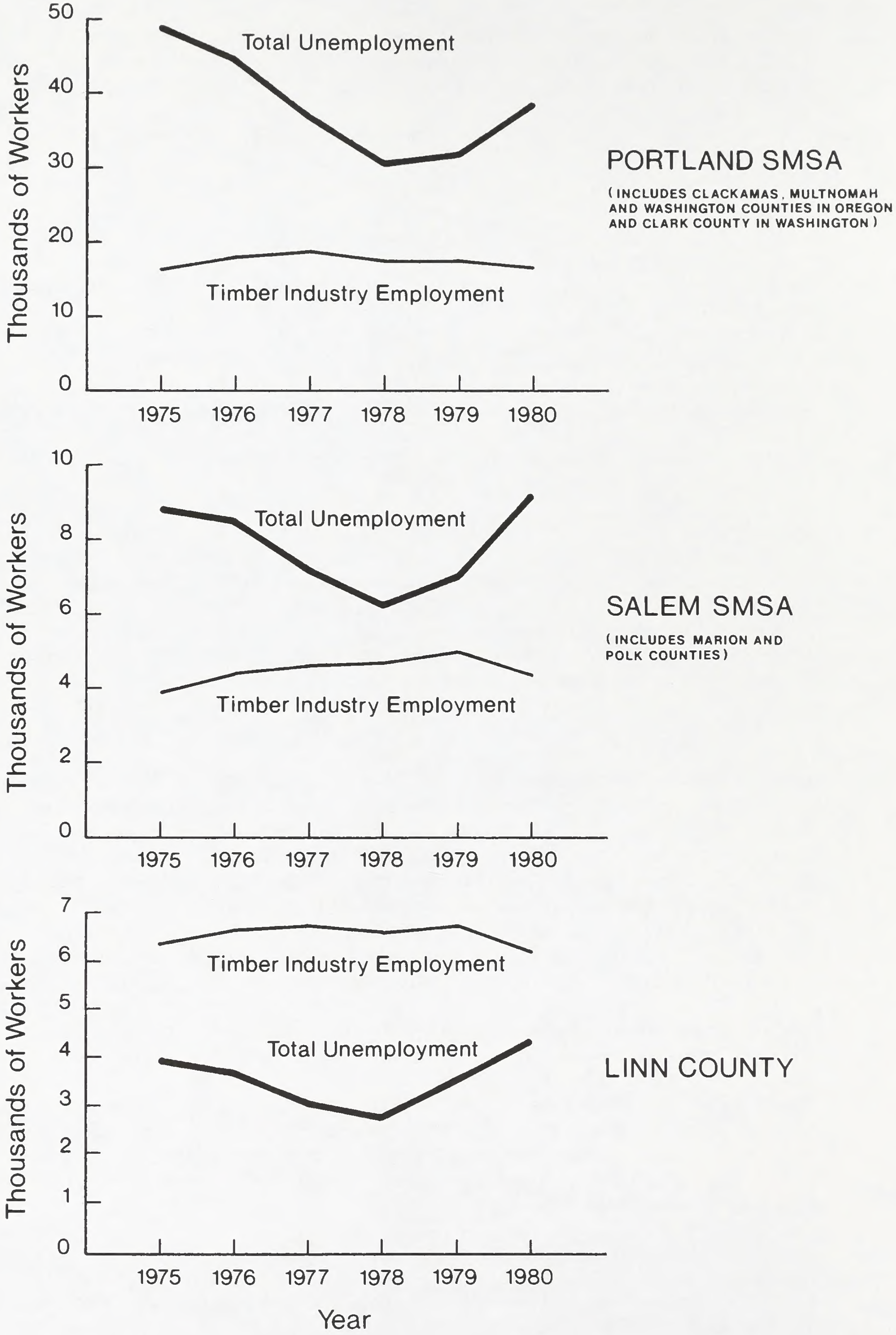


FIGURE 2-4
COMPARISON OF TRENDS IN UNEMPLOYMENT
AND TIMBER EMPLOYMENT, 1975 - 1980

Table 2-15 Earnings and Employment Generated by the Timber Industry1/, 1979

Item	Clackamas	Linn	Marion	Multnomah	EIS Area
Worker earnings in the timber industry2/	$ 88,968,600	$124,036,200	$ 57,300,700	$112,388,200	$382,693,700
Earnings multiplier3/	2.584	1.638	2.547	2.156	-
Total earnings generated	$229,894,900	$203,171,300	$145,944,900	$242,310,000	$821,321,100
Av. earnings per worker - all industries4/	$ 13,242	$ 13,971	$ 11,888	$ 14,251	-
Total employment generated	17,361	14,542	12,277	17,003	61,183
Percent all employment5/	25%	43%	13%	4%	10%

1/ Includes lumber and wood products (SIC 24) and pulp, paper and board (SIC 26) industries. Omits workers in forest management activities classified as forestry, business services, and other industries.

2/ Earnings in employment covered by unemployment insurance (Oregon Department of Human Resources 1981).

3/ USDI, BLM 1978a. Multipliers shown are composites of industry multipliers for SIC 24 and SIC 26 adjusted by a factor of 1.16 to reflect earnings of proprietors omitted from earnings in covered employment. For basis, see Jackson-Klamath FEIS, Appendix I (USDI, BLM 1979).

4/ Total earnings generated is divided by average earnings per worker in all industries to estimate the total employment generated. This estimation method tends to overstate employment slightly, because worker earnings in the timber industry which account for a disproportionate share of the total income generated are substantially above average earnings.

5/ Based on estimates of total employment (BLM Oregon State Office economists).

Table 2-16 Employment and Earnings Generated by BLM Timber Harvest
(Based on 1976-78 average harvest)

Item	Clackamas	Linn	Marion	Multnomah	EIS Area
Timber harvest (MM bd. ft.)[1]	28.998	38.436	12.975	.014	80.423
Logging employment ratio[2]	1.780	1.415	1.780	1.780	-
Logging employment	52	54	23	-	129
Timber consumption (MM bd. ft.)[1]	21.588	47.625	1.284	.002	70.499
Employment ratio[2]	4.197	5.330	5.144	4.642	-
Other wood products employment	91	254	7	-	352
Pulp, paper and board employment[3]	102	65	46	114	327
Employment in timber industry	245	373	76	114	808
Percent county timber employment	6%	6%	2%	2%	4%
Av. earnings/timber worker (1979)[4]	$20,193	$18,521	$16,878	$19,984	-
Earnings in timber industry (x 1,000)	$ 4,947	$ 6,908	$ 1,283	$ 2,278	$15,416
Multiplier[5]	2.584	1.638	2.547	2.156	-
Total earnings generated (x 1,000)	$12,783	$11,315	$ 3,268	$ 4,911	$32,277
Percent 1979 county total	1%	2%	[6]	[6]	[6]
Av. earnings/worker - all industries	$13,242	$13,971	$11,888	$14,251	-
Total employment generated	965	810	275	345	2,395

[1] USDI, BLM 1980b. Timber harvest consumed outside the area is omitted.

[2] USDI, BLM 1980b. 1976 employment ratios for lumber mills and plywood mills developed by Wall and Oswald (1979) weighted by respective shares of 1976 log consumption in county from Howard and Hiserote (1978). Adjusted from Scribner long log to short log basis.

[3] Estimated by ratio of industry employment in county to total log consumption in EIS area.

[4] Oregon Department of Human Resources 1981.

[5] From Table 2-15.

[6] Less than 0.5 percent.

In some local communities, BLM harvests account for as much as 35 percent of timber industry log supplies (and an equivalent amount of timber industry employment). These estimates were made by comparing receipts of BLM logs (1975-77 average) with total log use estimated from timber processing employment data (Oregon Department of Economic Development 1980) assuming five workers per million board feet log use. Communities which were dependent on BLM harvests for 10 to 35 percent of their log supplies during the 1976-78 period included Molalla-Mulino in Clackamas County, and Lyons and Sweet Home in Linn County. Independence in Polk County obtained a significant part of its supplies from the SYUs in addition to supplies from BLM lands elsewhere.

Timber sale volumes from the SYUs were relatively high early in the 1970's, but were generally less than 85 MM bd. ft. in the latter half of the decade. The 1971-80 decadal average was 90.4 MM bd. ft. In the 1980 fiscal year, sales were 91.5 MM bd. ft. Timber purchasers have 3 years in which to harvest and pay for the timber purchased, and harvest schedules may vary widely from sales schedules. In Figure 2-5, a comparison of sales and harvests shows how harvest volumes have differed from sales during the past decade. Harvest volume averaged 93 MM bd. ft. per year, but varied from a high of 137 MM bd. ft. to a low of 52 MM bd. ft. In the period 1976-1978, representative of the latter part of the decade, volume averaged 80.4 MM bd. ft.

Fishing

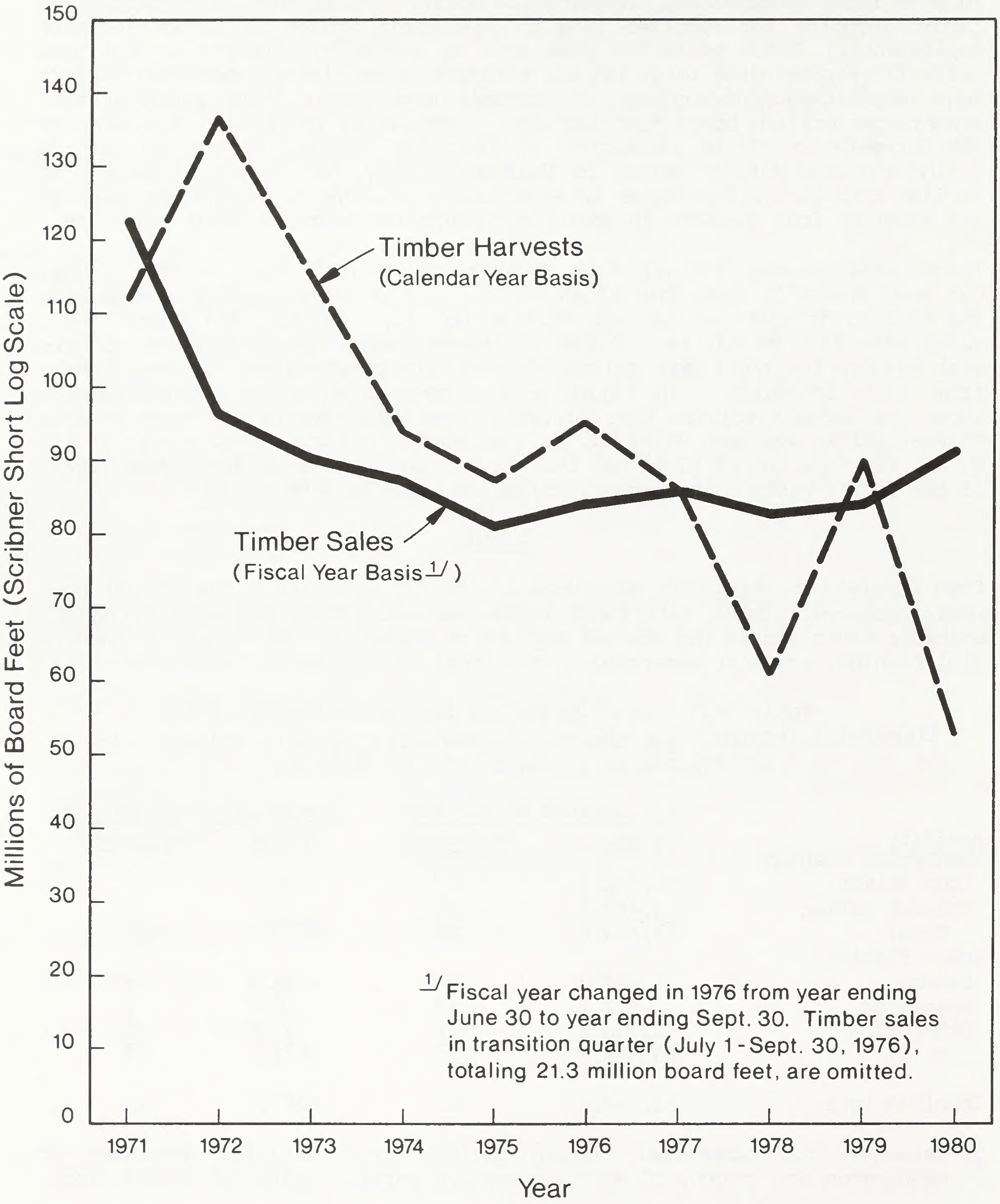
Fish populations dependent on rivers in the EIS area are a significant economic resource. Table 2-17 shows income and employment generated along the Columbia River and in the coastal regions of Washington and Oregon by commercial fishing, and that generated in the local area by sport fishing activity.

Table 2-17 Local Income and Employment Generated by Commercial Fishing[1] and the Trip Expenditures of Sport Anglers, 1975
(Income in thousands of 1979 dollars)

	All Habitat in EIS Area		BLM-administered Habitat	
Activity	Income	Employment	Income	Employment
Commercial fishing:				
Coho salmon	$1,752.4	107	$108.8	7
Chinook salmon	1,400.6	97	41.5	3
Total	$3,153.0	204	$150.3	10
Sport fishing:				
Salmon	$1,174.2	144	$ 44.5	5
Steelhead	512.5	63	16.8	2
Other fish	3,323.1	406	51.9	6
Total	$5,009.7	613	$113.1	13
Combined total	$8,162.7	817	$263.4	23

[1] Estimates for commercial fishing include total activity generated in Washington and Oregon, of which an unknown portion occurs in the EIS area.

Source: USDI, BLM 1980b; Centaur Associates 1979; Oregon Department of Fish and Wildlife 1981. Estimates adjusted to represent 1975 activity levels valued at 1979 price levels.



[1] Fiscal year changed in 1976 from year ending June 30 to year ending Sept. 30. Timber sales in transition quarter (July 1-Sept. 30, 1976), totaling 21.3 million board feet, are omitted.

FIGURE 2-5

TIMBER SALES AND HARVESTS
EASTSIDE SALEM SYUs 1971-1980

Terrestrial Wildlife

Wildlife in the EIS area provides the basis for quantifiable amounts of hunting and trapping activity. Non-consumptive wildlife uses also generate significant values which have been included in dispersed recreation.

Local income and employment generated by hunting activity are shown in Table 2-18 for the year 1975. Income estimates have been adjusted to 1979 price levels in order to make them comparable with other monetary values in the discussion.

Fur trapping in fiscal 1978 yielded about $134,000 to trappers in the EIS area (reported fur catch valued at average fur prices) (Oregon Department of Fish and Wildlife 1980). Assuming the fur catch on BLM-administered lands in each county was proportional to BLM's share of total land area, the yield from BLM lands amounted to $5,500.

General Recreation

Local income and employment generated by recreational visits to sites or areas of the type provided by BLM (apart from those related to fish) are shown in Table 2-18. These estimates are based on the recreation visitation estimates displayed in Table 2-9.

Table 2-18 Local Income and Employment Generated
by Hunting and General Recreation Activity, 1975
(Income in thousands of 1979 dollars)

	Entire EIS Area		BLM-administered Lands	
Activity	Income	Employment	Income	Employment
Big game hunting	$ 985.4	120	$49.9	6
Upland game hunting	223.7	27	3.8	0
Hunting Total	$1,209.1	147	$53.7	6
Camping - developed sites	$ 2,497.3	305	$ 21.2	3
Picnicking - developed sites	$15,315.8	1,873	230.4	28
Dispersed recreation	1/	1/	731.4	89
Recreation Total	$17,813.1	2,178	$983.0	120

1/ Estimates for dispersed recreation in the entire EIS area are omitted because available data represent predominantly urban activities. Thus, the general recreation totals for the EIS area are not directly comparable with the totals for BLM-administered lands.

Source: USDI, BLM 1980. Income estimates adjusted to 1979 dollars. Employment estimates derived by dividing income estimates by average individual income of direct and indirect income recipients.

Public Finances

Payments are made to State and local governments from land management revenues and, in a minor amount, from appropriations. In the EIS area, such payments originate from O&C lands and other BLM-administered lands (public domain). Most of the revenues derived from these lands are from timber sales.

Fifty percent of the revenue from all O&C lands in the State is distributed among the counties with O&C lands in proportion to the 1915 assessed value of the O&C lands in each county. Total O&C revenues for the fiscal year ending September 30, 1980, were $195,214,025 of which $12,014,408, or 6 percent, came from lands administered by BLM within the EIS area. Table 2-19 shows the importance of the O&C revenue distribution to individual counties in terms of property tax equivalents. The table also indicates the wide year-to-year variations in O&C revenues caused by the variations in harvest rates and prices. O&C timber sales in the SYUs in fiscal 1980 were $24,387,747, and total O&C sales were $333,102,471; however, timber purchasers have 3 years in which to harvest and pay for contracted timber. Poor market conditions have caused a backlog of over $700 million in uncut timber to accumulate on O&C lands statewide.

Table 2-19 O&C Revenue Distribution to Counties Expressed as Property Tax Rate Equivalent and as Percent Supplement to Total Levy, FY 1977-1980

	Amount per $1,000 Assessed Value1/				Percent Supplement to Levy2/			
County	1977	1978	1979	1980	1977	1978	1979	1980
Benton	$3.36	$2.26	$2.03	$2.05	21.9	12.3	12.4	10.5
Clackamas	1.69	1.17	1.01	.90	6.8	5.4	5.5	4.6
Columbia	2.20	1.77	1.86	1.86	15.2	12.7	13.0	11.7
Coos	6.59	5.32	4.81	4.59	30.9	31.9	29.0	25.3
Curry	13.27	9.81	8.38	7.09	120.2	102.1	92.9	109.2
Douglas	14.47	12.44	11.59	11.50	90.0	110.3	103.8	79.5
Jackson	9.78	6.90	5.85	5.51	50.5	39.3	41.2	33.0
Josephine	18.23	11.78	10.04	9.56	119.1	74.4	89.8	63.0
Klamath	2.47	1.85	1.73	1.68	17.3	13.4	13.7	11.7
Lane	3.92	2.91	2.48	2.36	17.1	14.1	13.6	11.6
Lincoln	0.45	0.40	0.33	0.31	3.4	2.5	2.2	1.6
Linn	1.77	1.39	1.37	1.30	9.4	8.2	8.5	7.1
Marion	0.62	0.43	0.39	0.36	2.6	2.0	2.0	1.7
Multnomah	0.13	0.09	0.08	0.08	0.5	0.4	0.4	0.4
Polk	3.91	2.75	2.43	2.41	16.2	13.6	13.1	12.2
Tillamook	1.38	1.14	1.03	0.93	8.2	7.7	6.4	8.7
Washington	0.19	0.13	0.11	0.10	0.8	0.6	0.6	0.5
Yamhill	1.09	0.75	0.67	0.64	4.9	3.7	3.6	3.1
Average	3.01	2.19	2.54	1.81	13.6	10.9	10.9	9.5

1/ Represents county O&C distribution for fiscal year (ending September 30) divided by total assessed value (in thousands) on January 1 of same calendar year.

2/ Represents O&C distribution as percent of total property tax levy for following year, e.g., fiscal 1977 distribution as percent of 1977-78 levy.

Source: USDI, BLM 1978a, 1980e; Oregon Dept. of Revenue 1979, 1980, 1981.

A net of 4 percent of revenues from public domain lands is remitted to State governments. These revenues in Oregon are distributed to counties on the basis of total land areas for the benefit of county roads and bridges. Total revenues from such lands in the EIS area were $858,371 in fiscal 1980, resulting in the distribution of minor amounts among Oregon's 36 counties.

Local Income Attributable to BLM-Administered Lands

In summary, the principal sources of local personal income arising from lands administered by BLM in the EIS area are:

Timber	$32,233,000
Fishing (including sports)	263,400
Hunting and trapping	59,200
Other recreation	983,000
Total	$33,538,600

Local income from fishing as shown includes income from commercial fishing in other parts of Oregon and Washington which could not be separately estimated. The amounts shown omit the in-lieu tax payments and other BLM-generated revenues accruing directly to the local governments in the area.

Social Concerns

Timber harvesting and processing, as a major economic support of some of the local economies, influences social attitudes and concerns of residents. The current depression in the local economy has raised concern about the timber industry.

The fluctuations of the industry have required people to adjust to changes in their welfare. The expectation of a major reduction in the timber supply (and employment) in one or two decades has increased concern about the timber supply.

The seasonal variations in timber industry employment and the longer fluctuations in employment attributable to market conditions have produced a kind of dual work force in the industry consisting of a core of stable, senior workers and a peripheral group of more mobile workers who shift between the higher-paying timber industry jobs and other employment depending on job availability (Stevens 1976). In the woods, sharp social distinction is drawn between workers in logging and those in forest management activities. Pay scales differ widely between these groups, and an unemployed logger would be very unlikely to accept a lower-paying forest management job.

A recent statewide survey by Bardsley and Haslacher (Harris 1979) showed that residents of the Portland metropolitan area and the Willamette Valley have desires concerning the use of Federal lands similar to people in Oregon as a whole. The majority of those surveyed favored increased wildlife habitat, hiking and camping, and hunting and fishing, and less use of off-road vehicles and snowmobiles. Survey respondents also showed a preference for more wilderness and for more timber production. These survey results are shown in Table 2-20.

Herbicide use is a controversial issue having many vocal advocates and opponents. Advocates believe it is an economically practical and safe means of increasing timber production by controlling competing vegetation when used with proper safeguards. Opponents believe further evidence is needed to prove that herbicide use is less expensive than other means. They also believe herbicide use may be damaging to the environment and harmful to human health.

Table 2-20 Changes Desired by Survey Respondents in the Use of Federal Lands
(Percent distribution, undecided respondents not shown)

	Oregon			Metro Portland			Willamette Valley		
Use	More	No Change	Less	More	No Change	Less	More	No Change	Less
Wildlife habitat	61	30	8	63	30	5	62	31	5
Hiking/Camping	52	38	8	54	39	5	53	35	10
Wilderness	44	38	16	50	39	9	44	40	14
ORVs/Snowmobiles	13	24	60	12	21	64	13	23	61
Timber production	41	38	19	33	46	18	40	36	22
Hunting/Fishing	51	40	7	50	36	12	52	40	7

Source: Harris 1979.

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

CHAPTER 3 ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

In this chapter, environmental consequences (impacts) are compared to the existing situation, as described in Chapter 2. Economic impacts are based on the existing situation plus projections of price and revenue levels under Alternative 7 (No Action). The significant impacts resulting from implementation of the proposed action and each of the alternatives are analyzed in relation to these baselines. A tabular comparison of composite impacts from the proposed action and each alternative is shown in Table 1-5. Analysis, including the scoping process, indicates that there would be no significant impacts upon climate, geology, topography, minerals, grazing, agriculture, utilities, communication sites, paleontological sites and wilderness. Therefore, these topics are not discussed.

The major actions which cause impacts are timber harvest, road construction, site preparation (includes slash burning and herbicide use), animal damage control, plantation maintenance and release, precommercial thinning and fertilization. Significant effects to the local area and its economic base can also occur depending upon which alternative and harvest volume levels are ultimately selected. These would include changes in employment, personal income and sharing of sale receipts with county governments, school districts and other local taxing entities.

In analyzing the impacts of the proposed action, a sample 5-year (1984-88) timber sale plan (available for review at the Salem District Office) was developed and used, where applicable, to assess potential site-specific timber sale impacts. Although a 5-year plan is used for analysis purposes, it is considered typical for the entire decade. Possible conflicts identified in this chapter for specific sales will be thoroughly addressed in detailed site-specific environmental assessments. Timber management treatments not included in the timber sale plan (brushfield and hardwood conversion, planting, vegetation control with herbicides, animal damage control, precommercial thinning and fertilization) are analyzed at the proposed 10-year levels. Site-specific environmental assessments will be prepared when specific acreages are identified for each treatment. Analysis of the alternatives, including the proposed action, is based on the different levels of treatments shown in Table 1-2.

In many cases, existing resource data are limited, and specific sites for proposed timber management activities are not known for the 10-year plan period. As a substitute, "most probable case" and "worst case" assessments are addressed in this chapter.

Two time frames are used in the analysis process. The short term is the first 10 years following the adoption of a new timber management plan. The long term is defined as beyond 10 years. Other time periods pertinent to specific impact discussions are used as necessary and identified in the text.

A basic assumption of the analysis is that sufficient funding and personnel will be available for implementation of the final decision.

IMPACTS ON AIR QUALITY

During the next decade, the major pollutant from BLM timber management activities would continue to be smoke from slash burning. Estimated levels of burning activity by alternative are depicted in Table 1-2 (Treatments, Site Preparation, Broadcast Burning). Compared to the existing situation (Alternative 7), burning would increase by 500 acres per year under Alternative 1 and decrease by 240 acres per year under Alternative 4.

Regardless of the alternative selected, all burning would be done in accordance with the Oregon Smoke Management Plan. Normally, smoke would be carried into upper air levels and away from populated areas. Occasionally, unforecasted weather changes could cause some smoke to return to surface areas, causing relatively brief visible intrusions in nearby residential areas. The probability of intrusion would be highest under Alternative 1, due to more acres burned, and lowest under Alternative 4. Past experience indicates that visible intrusions in residential areas are not likely to occur from BLM burning in the SYUs during the decade.

IMPACTS ON SOILS

The major impacts of timber management on soils are compaction, landsliding, topsoil removal and depletion of organic matter, nitrogen and other nutrients. Each results in a loss of soil productivity (see Glossary). These impacts are derived primarily from road, fire trail and landing construction; yarding logs; scarification and slash burning.

Several measures would be employed to minimize adverse impacts on soils where feasible. Compacted soils would be tilled to partially restore productivity; partial and total suspension yarding systems would be used to minimize loss of soil productivity; new roads would be located on ridgetops, made narrow and designed to avoid undercutting or overloading unstable slopes; excess road material on unstable and potentially unstable slopes would be end-hauled to reduce landsliding; scarification would be done without piling soil; and slash burning and scarification would be avoided on thin, droughty (see Glossary) or nitrogen-deficient soils.

Table 3-1 shows estimated acres upon which soil productivity would be lost as a result of timber management under the proposed action and alternatives during the first decade.

Soil compaction results primarily from the weight and shearing forces involved in dragging logs and operating ground-based logging equipment. Compaction hinders root penetration, reducing vegetation growth potential. Decreases in root penetration of 35 to 65 percent can reduce the vegetative productivity of soils by 10 to 25 percent (Power 1981a). Yarding systems using ground-based equipment have a higher impact on soils than cable systems which drag the logs. Systems using total suspension have the least impact on soils.

Land scarification by tractors with brush rakes compacts soil and displaces topsoil. This practice can be expected to reduce soil productivity by 11 to

Table 3-1 Estimated Acres Lost from Production During First Decade

Processes	Acres Lost from Production, by Alternative[1/]							
	PA	1	2	3	4	5	6	7
Compaction & Topsoil Removal	1,171	1,437	1,070	1,213	840	1,344	1,214	1,321
Dry Ravelling	307	421	292	300	228	325	305	335
Debris Avalanches	30	38	30	30	25	30	30	32
Debris Torrents	70	110	70	70	65	70	70	74
Slump-earth Flows	acreage data unavailable							
Nutrient Depletion	acreage data unavailable							

[1/] Data represent estimated acres of soil productivity lost as a result of road and landing construction, yarding of logs or operation of ground-based logging equipment. Data were calculated by taking the percentage of production loss from each process and multiplying it by the acres to be impacted by each process.

Source: Power (1978, 1981b).

22 percent (Clutter and Dell 1978). One study in the Salem District showed a reduction of 17 percent in productivity after scarification (Power 1981c). Topsoil is also removed by dragging logs and by constructing fire trails, roads and landings with heavy equipment.

Natural variability in parent materials (see Glossary) and soils forming from them result in slopes having different potentials for dry ravelling and landsliding (mass movement). These processes occur in the SYUs primarily on slopes greater than about 65 percent. Landsliding on steep slopes includes debris avalanches and torrents.

Dry ravelling is active throughout the year in the SYUs and results in decreased soil depth and loss of topsoil. Vegetative cover controls this process by trapping soil. When vegetation is removed by yarding logs, slash burning or other practices, trapped materials move and ravelling is accelerated. On steep, south-facing slopes this process may continue for 20 to 30 years after disturbance where vegetation does not become fully reestablished.

Power (1981c) found that under natural conditions, soil movement from dry ravelling averaged .006 inch/year on slopes of approximately 65 percent. Soil movement from ravelling can increase by more than 30 times the natural amount following road construction. Similar ravelling rates can be expected in cable skid roads on slopes greater than 65 percent, resulting in the loss of approximately 4 to 6 inches of soil depth over a 20- to 30-year period. Removal of topsoil and reduction of 15 to 25 percent of soil depth will decrease soil productivity by as much as 45 percent (Power 1981d).

Debris avalanches in the SYUs are triggered by sidecasting of road materials, road fill failures, yarding logs and diversion of water from roads. Swanston and Swanson (1976) reported that, compared to undisturbed forest, average soil loss from debris avalanches was nearly three times greater as a result of clearcutting and 146 times greater as a result of road construction.

Debris torrents typically involve the rapid movement of water-charged soil, rock and organic material down steep stream channels. They are often triggered by debris avalanches but also by road failures and by partial and no-suspension cable yarding. One study showed that, on the average, debris torrent erosion increased nearly seven times from clearcuts and nearly 88 times from roads, compared to undisturbed forest (Swanston and Swanson 1976). Similar erosion rates can be expected in the SYUs.

Slump-earth flows (see Glossary) often occur in areas with poorly drained parent materials. They occur naturally, but timber management practices can increase or retard their movement by overloading, undercutting and/or changing subsurface water flows on unstable slopes. The amount of land subject to slump-earth flows has not been identified in the SYUs except in the most fragile areas.

Soil fertility (capability to produce plant growth) is strongly dependent upon a soil's organic matter and nitrogen content. Any disturbance that reduces the vegetative cover, duff layer or soil itself will reduce organic matter and nitrogen. Scarification and practices which increase dry ravelling are major factors responsible for the removal of duff layers and topsoil. Slash burning removes vegetation and duff and directly depletes total nitrogen in topsoil. In areas where burning is of high intensity, as much as one-half of the total nitrogen in the top 1 inch of soil may be depleted. While available nitrogen may temporarily increase, severe total nitrogen deficiencies can result, reducing soil fertility (Power 1981e).

The severity of long-term adverse impacts on soil productivity is related to amount of acres harvested, logging systems employed, miles of road constructed and protection given fragile sites. Alternative 4 would have least impact due to fewest roads and harvest units, maximum use of total suspension logging systems and either avoidance or strict control of surface-disturbing activities on fragile sites. The highest impact would occur under Alternative 1, which allows road construction and/or timber harvest on 90 percent of BLM-administered land, including severely fragile sites. Compaction, topsoil removal, landsliding and fertility loss would be severe under this alternative.

Approximately 8,200 acres are scheduled for harvest in the sample 5-year timber sale plan. This includes 50 acres of severely fragile lands, 400 acres of moderately fragile lands and 5,150 acres of slightly fragile lands. Soil productivity would be temporarily or permanently lost on an estimated 1,100 acres of land in the SYUs as a result of timber management activities during this 5-year period. Soil productivity would be partially restored on approximately 700 of these acres through tillage, though only 50 percent restoration can be expected. The net result, after mitigation, would be an irretrievable loss of soil productivity on approximately 750 acres of land.

Conclusions

Impacts to soils from compaction, topsoil removal, landslides and nutrient depletion would occur under the proposed action and all alternatives, resulting in an irretrievable loss of some soil productivity. Adverse impacts would be greatest under Alternative 1 and least under Alternative 4.

IMPACTS ON WATER RESOURCES

Forest management activities which would impact water resources include road building, timber harvest, slash burning and application of fertilizers and herbicides. These activities can affect water yields, seasonal streamflow characteristics (peaks and low flows), sedimentation and instream water quality (temperature, dissolved oxygen, nutrients and organic substances). The magnitude of each impact would depend upon the amount of timber harvested in each watershed, the proximity of the activities to streams, and the site-specific application of mitigating measures. Mitigation to be applied may include falling timber away from streams, equipment restrictions and seasonal logging restrictions.

Forest harvest activities would have very little effect on the streamflow of larger rivers draining the SYUs. Table 3-2 shows estimates of annual water yield from public lands in the SYUs for each alternative, compared to the existing yield.

Table 3-2 Estimated Annual Water Yield
From BLM-Administered Land, End of First Decade

Situation	Annual Water Yield (acre-feet) 1/	Percent Change From Existing
Existing	897,320	--
Proposed Action	890,312	-0.8
Alternative 1 (Max. Tbr.)	898,267	+0.1
Alternative 2 (Emp. Tbr.)	891,312	-0.7
Alternative 3 (Mod. Tbr.)	890,625	-0.7
Alternative 4 (Emp. Other)	883,143	-1.6
Alternative 5 (Acc. Tbr.)	892,566	-0.5
Alternative 6 (No Herb.)	889,316	-0.9
Alternative 7 (No Action)	891,515	-0.6

1/ Estimates of water yield are based on recorded and projected harvest levels and were calculated using the water yield increase analysis procedure developed by the U.S. Forest Service (USDA, FS 1974b).

Although the effect of timber harvest on streamflow in the larger rivers would be small, local increases in water yield would occur in clearcut areas. Removing forest vegetation reduces evapo-transpiration (see Glossary), thereby increasing the amount of rainfall available for streamflow. Studies of clearcutting small watersheds in western Oregon showed that water yields from clearcut areas increased 26 to 43 percent following harvest (Harris 1977; Rothacher 1970; Harr et al. 1979). Based on Rothacher's (1970) study of clearcutting in the central Oregon Cascades, water yield from clearcut areas in the SYUs is expected to increase 35 percent. The duration of increased water yields is not easily predicted; however, varying degrees of altered yields may last up to 35 years (Kovner 1956, Cited In Harr et al. 1979).

In addition to altering total annual water yields, timber harvest would affect the timing and magnitude of seasonal streamflows in small watersheds in the SYUs. Rothacher's (1970, 1973) study of small watersheds near the SYUs showed fall and spring peak flows were increased by logging, although extreme winter peaks were relatively unaffected. A recent analysis (Christener 1981) suggests that extreme winter peaks may also be increased by timber harvest if the peaks occur from heavy rainfall on an existing snowpack. Summer low flows would also be increased by timber harvest. Studies of other small watersheds in the central Oregon Cascades (Rothacher 1971) suggest minimum flows for small watersheds in the SYUs would increase up to 300 percent. Although relative changes in minimum flows may be large (200 to 300 percent), absolute changes would be small, due to naturally low levels of streamflow during the summer months. Increases in peaks and low flows would be greatest in small watersheds sustaining the greatest increases in clearcut acreages during the next decade (e.g., Dead Horse Creek).

Timber harvesting, road building and slash burning would increase sediment discharge from affected small watersheds in the SYUs. Fredriksen and Harr

(1979) reported that logging in the central Oregon Cascades increased suspended sediment yield 23 times the natural rate (undisturbed conditions) in a patch cut watershed with roads, and nine times the natural rate in a clearcut watershed without roads. Similar increases in sediment yield can be expected in small watersheds within the SYUs where mass soil movement (debris avalanching) is the dominant erosion process (see Chapter 3, Impacts on Soils). In undisturbed watersheds, streams are usually capable of transporting more sediment than is delivered to them (Rice et al. 1979). Following timber harvest, road construction and slash burning, an overabundance of sediment and debris would be delivered to drainage systems. Sediment discharge would then no longer be determined by the availability of sediments, but by the transporting ability of streams. Where stream energy is insufficient to transport all the sediment, deposition would occur.

Estimates of annual sediment yield for the SYUs are presented in Table 3-3. Estimated changes in sediment yield relative to existing yields vary from an increase of 3 percent under Alternative 1 to a decrease of 10 percent under Alternative 4. While variation between alternatives is small, estimated total yields represent approximately three times the rate for undisturbed watersheds.

Table 3-3 Estimated Annual Sediment Yield
From BLM-Administered Land, End of First Decade

Situation	Annual Sediment Yield (tons)	Percent Change From Existing
Existing	24,802	--
Proposed Action	23,815	-3.9
Alternative 1	25,511	+2.9
Alternative 2	24,027	-3.1
Alternative 3	23,865	-3.9
Alternative 4	22,265	-10.2
Alternative 5	24,285	-2.1
Alternative 6	23,607	-4.8
Alternative 7	24,329	-1.9

The chemical quality of surface water would be affected by slash disposal. In one Oregon Cascades watershed studied by Fredriksen (1971), instream concentrations of ammonia-nitrogen and manganese reached peak levels of 7.6 and 0.44 parts per million (ppm), respectively, following slash burning. Fredriksen attributed the high concentrations of ammonia-nitrogen and manganese to burned slash in stream channels. In the SYUs, all alternatives except 1 would provide adequate protection for larger streams (third order and larger) to prevent burned slash from entering stream channels. Only Alternative 4 would provide adequate protection from slash burns for all second order streams. None of the alternatives would protect first order streams from slash burns. Ammonia-nitrogen and manganese concentrations could exceed recommended water quality standards (0.02 ppm for free ammonia-nitrogen, 0.05 ppm for manganese) in some first order streams for several days following slash burning. However, water from these streams would quickly be diluted upon entering second order or larger streams. Substantial increases in nutrient concentrations following forest fertilization are not expected in the SYUs.

Timber harvest affects stream temperatures by removing shading vegetation from streambanks. Stream temperature increases of 10° F or more have been recorded following removal of streamside vegetation by clearcutting and burning in both the Oregon Cascades and Coast Range (Brown and Krygier 1970; Levno and Rothacher 1969). None of the alternatives provides temperature maintenance for first order streams. Under Alternatives 1, 2 and 7, removal of riparian zone vegetation on second order and larger streams would affect water temperatures. Because downstream shading does not significantly lower temperatures of streams warmed by upstream exposure (Brown et al. 1971), temperatures of larger streams in the SYUs would increase when small tributaries are exposed by clearcutting.

Harvest activities may reduce instream concentrations of dissolved oxygen by adding debris to streams. Fine organic debris (such as small twigs and needles) uses dissolved oxygen during decomposition. This depletes dissolved oxygen concentrations at times of high stream temperatures, low streamflows and low available oxygen. Since instream oxygen concentrations quickly return to normal following stream cleanout and fall rains (Hall and Lantz 1969), low instream oxygen concentrations would only be local and temporary in the SYUs. However, oxygen concentrations in stream gravel may continue to decline for several years after logging, because water flow through gravels is restricted by sedimentation (Hall and Lantz 1969). For this reason, impacts on intragravel oxygen in the SYUs will be directly related to the changes in sediment yield already discussed.

The effects of herbicide application on water quality have been described elsewhere (USDI, BLM 1978b). Design elements (see Chapter 1) such as buffer strips are expected to reduce herbicide drift or accidental direct spraying of water bodies. Amounts of herbicide reaching streams beyond these barriers would be insignificant and would not adversely affect water quality. Movement of herbicides through the soil (leaching) is relative, and is usually measured in terms of inches or a few feet (Norris 1975). This is a slow process that would not lead to stream contamination, because the herbicide would degrade before reaching free water (Ibid). For additional discussion, see Chapter 3, Impacts on Animals and Chapter 3, Impacts on Human Health.

Table 3-4 lists acres of BLM-administered land in municipal watersheds that would be harvested under the sample 5-year timber sale plan. Nothing in the sample plan is expected to affect the quality of these streams as municipal supply sources.

Table 3-4 BLM-Administered Lands in Municipal Watersheds Proposed for Harvest in the Sample 5-Year Timber Sale Plan

Water District	Water Supply	Acres Proposed for Harvest
Albany	So. Santiam River	1,807
Canby	Molalla River	1,775
Clackamas	Clackamas River	1,214
Colton	Jackson Creek	18
Corbett	Gordon Creek	502
Estacada	Clackamas River	620
Gates	No. Santiam River	0
Lebanon	So. Santiam River	1,807
Lyons/Mehama	No. Santiam River	305
Mill City	No. Santiam River	0
Milwaukie	Clackamas River	1,214
Molalla	Molalla River	1,587
Oregon City	Clackamas River	1,214
Portland	Bull Run River	0
Salem	No. Santiam River	305
Sandy	Alder Creek	54
Silverton	Abiqua Creek	117
Silverton	Silver Creek	0
Stayton	No. Santiam River	305
Sweet Home	So. Santiam River	1,660

Conclusions

Except for small changes in total sediment yield, the proposed action and all alternatives would have very little effect on the water quality of larger streams draining the SYUs.

Increases in stream temperatures, water yields, peak and low flows, and decreases in dissolved oxygen would occur within some small watersheds following timber harvest. Overall increases would be greatest under Alternative 1 and least under Alternative 4.

IMPACTS ON VEGETATION

Terrestrial Vegetation

Timber management would have widespread impacts on terrestrial vegetation of the SYUs. Both target and nontarget vegetation in areas scheduled for timber management would be directly affected by road building, timber harvest and treatments. Offsite vegetation would receive secondary impacts. The degree to which existing and future vegetation would be affected depends on the intensity of each management treatment (see Table 1-2).

Transportation Systems

Sites designated for permanent use as roads, landings, rock storage areas, rock pits and quarries would not support vegetation and would therefore represent irreversible losses of habitat. During the coming decade, vegetation eliminated by road construction is expected to vary from 685 acres under Alternative 4 to 1,197 acres under Alternative 7 (see Table 1-2). Blasting, excavation, operation of tracked and wheeled vehicles, and the spreading or dumping of excess excavation material and woody debris will kill or injure some vegetation. Soil disturbance resulting from such activities creates an altered environment usually colonized by grasses, forbs and other low vegetation. Occasionally such areas are seeded with non-native species in attempts to reduce erosion. All of the above-mentioned practices disrupt vegetation. The impacts are long term but local in extent.

Timber Harvest

Timber harvest would result in widespread and long-term impacts on the vegetation of the SYUs. Harvesting alters existing vegetation and affects future plant communities. Acres that would be affected by harvest range from 10,822 under Alternative 4 to 20,617 under Alternative 1.

In the process of felling and removing merchantable trees, damage to remaining trees and understory vegetation results from crushing, uprooting, cutting or burying. This may lead to increased susceptibility to disease, pests or fire damage. The effects of logging on species composition and the progression of plant communities vary according to cutting and yarding practices. In most cases, impacts from yarding are temporary. Overstory removal and soil disturbance are major habitat modifications.

Harvesting creates openings in the forest canopy which vary from a few feet in diameter (partial cuts) to many acres in size (clearcuts). Small openings formed during commercial thinning and mortality salvage operations lead to changes in the growth rate and relative abundance of species present. Overstory trees and species intolerant to shade generally show increased vigor. Pioneer species may colonize disturbed ground, initiating secondary succession (see Glossary) within the stand.

Clearcuts and partial cuts essentially represent conversion of second growth, mature and old-growth conifers to early successional stages. Changes in age class distribution for each alternative are displayed in Appendices F and I.

Continuation of intensive timber management would not allow future forest stands within the Intensive Timber Production Base (see Table 1-2) to achieve old-growth status (196+ years). An analysis of computer cut runs for each alternative shows that the oldest stands present in the intensive management base at the end of the 40-decade projection period range from 70 years for Alternative 1 to 130 years for Alternatives 3 and 4. Consequently, some plant species associated with older age timber stands could be permanently excluded from intensively managed forest lands. In addition, younger age classes exhibit simpler structure. They contain fewer species and less variety in height, age and distribution of plants.

Treatments

Vegetation, slash and/or the condition of the ground surface at selected sites is commonly altered to reduce fire hazard and to expedite reforestation. In the process, existing vegetation is destroyed or damaged, and subsequent regrowth reflects changes in micro-climate and site characteristics. As slash and vegetation are chemically treated, burned or rearranged into piles, available shade is reduced and mineral soil is exposed. Such conditions favor pioneer and shade intolerant species, but reduce habitat for others.

Broadcast burning is the most frequently used method of site preparation (see Table 1-2). Impacts depend on the severity of individual burns. Past research (Cramer 1974) indicates about 5 percent of a treated area is severely burned. These acres have a higher percentage of herbaceous and brush cover within the first 2 years after burning. Most of the harvested acreage in the SYUs would be lightly burned or unburned.

Burning can suppress fast-growing shrubs, such as salal or vine maple, which compete with commercial tree seedlings. It can also stimulate regeneration of forbs and shrubs, especially Ceanothus. Availability of mineral soil and lack of competing vegetation enhance both natural and artificial reforestation. However, high surface temperatures associated with blackened soil surfaces and lack of shade can seriously hinder reforestation on steep slopes with south and southwest exposures.

Mechanical site preparation which exposes mineral soil indirectly enhances reforestation on most sites. It directly impacts residual vegetation through root damage, uprooting and crushing. Gross yarding (see Glossary) causes similar damage to vegetation locally, but lessens the likelihood and severity of impacts that could otherwise result from wildfire or broadcast burns that are too intense.

Stand conversion involves the replacement of one plant community with another. It represents a localized change in species composition as well as a shift to the simpler structure and lower diversity associated with young stands, especially conifer plantations. The conversion of brush fields, poor quality hardwoods and young hardwoods (less than 5 inches dbh) growing on former conifer sites is expected to range from 0 acres under Alternative 7 to 476 acres under Alternative 2 (see Table 1-2).

Assuming site preparation is timely and adequate, nursery-grown conifer seedlings are planted in clearcuts the first or second year following harvest. On plantations, conifers are numerous in all successional stages. After 10 to 15 years they can dominate other vegetation, precluding the maximum development of plant diversity in transitional plant communities. Since plantings usually consist of one primary species, the resulting forest exhibits a relatively low diversity of tree species, and is not a natural successional stage.

A relatively new and growing aspect of the reforestation program is use of genetically improved seedlings (see Chapter 1, Forest Management Treatments and Design Elements). Planting an estimated 10,049 acres with genetically improved trees during the proposal period would not have a significant effect on the natural gene pool (see Glossary) in either the short or long term. No significant adverse long-term impacts are anticipated with the eventual planting of genetically improved trees on 90 percent of the timber production base acres. Maintaining a broad selection of parent trees and setting areas aside from timber management would ensure variability in genetic base populations.

Herbicides are used to manipulate species composition, density and vigor. Applications are targeted to suppress grass and broadleaf species which would otherwise compete with conifers. Gratkowski and Lauterback (1974) reported on the height growth of young Douglas-fir after herbicide spraying. Percentage increase in height growth over trees in unsprayed stands varied from 130 percent (for trees 1 foot high when spraying occured) to 149 percent (for trees 6 feet high) for basal spray plots and from 255 percent (for trees 1 foot high) to 171 percent (for trees 6 feet high) for aerial spray locations. Although the direct impacts of herbicides are short term, the effects of accelerating the establishment of coniferous stands are long term. Once a coniferous stand becomes dominant, it will remain so until harvested or until insects, disease, fire or other natural forces destroy it.

Nontarget vegetation adjacent to spray units can be adversely affected if herbicides drift beyond spray boundaries. Such impacts are reduced, but not eliminated, by buffer strips and accurate application. For more information on herbicides and the monitoring of their application, see the FEIS Vegetation Management with Herbicides : Western Oregon - 1978 through 1987 (USDI, BLM 1978b).

Precommercial thinning is expected to have minor effects on understory vegetation. The reduced canopy density should stimulate growth of remaining vegetation. Dead saplings on the forest floor would create a fire hazard for a minimum of 3 years.

Selected timber stands would be fertilized following thinning operations. Fertilized acres would range from 9,282 under Alternative 1 to 0 under Alternative 7 (see Table 1-2). Fertilization results in immediate increases in available nutrients for all vegetation on the site. Such effects vary with site quality and last a maximum of 7 years.

Wetland and Aquatic Vegetation

Timber harvest adjacent to water, or road construction through wetlands, would have adverse impacts on wetland and aquatic vegetation. Significant impacts on plant communities would be caused by increased sedimentation, increased water temperatures, reduced water availability and similar modifications. Adverse impacts would be greatest under Alternative 1 and least under Alternative 4.

Threatened and Endangered Plants

Undiscovered populations of threatened or endangered plants are susceptible to any impacts described under "Vegetation." Under worst case conditions, direct effects of injury or death to plants could eliminate a species throughout all or a significant portion of its range. Changes in plant communities, micro-climate and site characteristics (such as water availability) could eventually eliminate a species by reducing its ability to compete with other plants on the site.

If any species of vascular plant is determined by the U.S. Fish and Wildlife Service to be threatened or endangered, any action that could lead to its extinction or contribute to its threatened or endangered status would be in violation of the Endangered Species Act of 1973 (as amended). Investigations prior to site-specific actions identify any sensitive, threatened or endangered plant species observed, and Environmental Assessments (EAs) stipulate measures necessary to protect them.

Conclusions

Alterations to the structure and development of plant communities would be the most severe, long-term and widespread impacts of the timber management program. Under intensive timber management, existing older forest communities scheduled for timber harvest would be converted to early successional stage communities. Appendix I shows amounts of old-growth and mature habitat that would be irretrievably lost.

Vegetation would be altered more often than eliminated, because natural revegetation or plantings would soon restore vegetation to most disturbed sites. Construction of permanent roads would permanently eliminate vegetation. Habitat changes could eventually eliminate certain species from some areas.

Short-term use of commercial forest lands for timber harvest would increase long-term production of wood fiber as old, slow-growing stands are replaced by young, fast-growing stands managed for optimum wood production. In the long term, as the area approaches a balance of age classes, maximum growth of commercial conifers would be achieved. Intensive timber management practices such as planting and herbicide application would favor survival of conifers and would suppress, but not eliminate, hardwood trees, shrubs and herbaceous plants. Diversity and complexity of plant communities would diminish as maximum growth of commercial conifers is emphasized.

IMPACTS ON ANIMALS

Terrestrial Vertebrates

Timber management affects wildlife primarily by modifying habitat. Wight (1974), Meslow (1977) and Thomas (1979) indicated that certain wildlife species are associated with forests of a particular age class and structure. Appendix E lists species occurring in the SYUs and their associations with various habitats. The close affinity of wildlife for particular habitat conditions underscores the importance of analyzing impacts of forest harvesting on habitat composition.

In the following discussion, changes in wildlife habitat conditions are assessed in relation to the composition, distribution and integrity of habitat types (see Chapter 2, Animals). The long-term (fifth decade) composite effects of these three factors under the various alternatives are shown in Table 3-5.

Table 3-5 Probable Changes[1] in Wildlife Habitat
Conditions on BLM-Administered Lands
During Next Five Decades

Habitat Component	Existing Condition[2]	Relative Changes by Alternative PA,6	1	2	3	4	5	7
Grass/Forb - Brush/Seedling (non-stocked to 15 years)	Poor	-	-	-	-	+	-	-
Pole/Sapling - 2nd Growth (16-115 years)	Good	-	-	-	-	+	-	-
Mature (116-195 years)	Good	+	-	+	+	+	+	-
Old Growth (196 + years)	Good	-	--	-	-	0	-	--
Hardwood	Poor	0	0	0	0	0	0	0
Riparian	Poor	+	--	0	-	++	+	--
Habitat Diversity	Fair	0	-	-	0	+	0	-

+ = Beneficial   - = Adverse   0 = None or Negligible

[1] Primary criteria for determining change ratings are summarized in Appendix I.

[2] Condition ratings reflect the composite effects of impacts on habitat composition, distribution and integrity (See Chapter 2, Animals).

The condition of grass/forb-brush/seedling and pole/sapling-second growth stages would be enhanced under Alternative 4, primarily because there would be fewer impacts from intensive forest management practices. The condition of these stages would decline under remaining alternatives, primarily due to greater use of intensive management practices and to acreage increases (current acreage is already adequate, and acreage increases in one stage would result in acreage decreases in another).

Mature forest habitat conditions would improve under the proposed action and Alternatives 2 through 6, but would decline under Alternatives 1 and 7, due to acreage reductions and poor distribution.

Old-growth habitat conditions would decline under all alternatives except 4, where better distribution and provision for replacement acres (see Appendix D) would compensate for reductions from existing old-growth levels.

Hardwood habitat conditions would remain similar to the existing situation under all alternatives, because hardwood acres, distribution and integrity would not appreciably change.

Riparian habitat conditions would be enhanced under the proposed action and Alternatives 4 through 6 due to increased protection. Road and yarding corridor intrusions would be reduced, and higher quality riparian habitat would eventually be available throughout the SYUs. Intrusions in riparian zones would still be allowed under the proposed action and Alternatives 3, 5 and 6. Road and yarding corridors could temporarily eliminate up to 25 percent of streamside habitat. This would be especially detrimental to wildlife in watersheds with little remaining natural streamside vegetation. Road and yarding corridors could also interfere with migration and travel routes. The condition of riparian habitat would generally decline under Alternatives 1, 2, 3 and 7, with least protection afforded by Alternative 1.

Alternative 4 would provide the best overall habitat composition, distribution and integrity. Under this alternative, older forest stages would be evenly distributed throughout the SYUs in adequate amounts to ensure the survival of species finding optimum habitat in these stages. In addition, riparian habitat along second order and larger streams would receive complete protection under this alternative. Remaining habitats would provide necessary conditions for diverse wildlife populations. Alternatives 1, 2 and 7 would be most detrimental to wildlife habitat in the SYUs, primarily by reducing the amount and distribution of old-growth habitat while generally increasing already abundant early successional stages. The integrity of early successional stages and riparian habitat would be diminished by widespread use of intensive management practices under Alternatives 1, 2 and 7. The proposed action and Alternatives 3, 5 and 6 would minimally change existing fair habitat diversity conditions.

Under each alternative, overall habitat composition in the entire Western Cascades area would remain stable despite major shifts on BLM-administered lands (See Appendix F). However, BLM-administered lands are important in maintaining older forest wildlife populations in the Western Cascades foothills, an area dominated by intensively managed forest lands.

Anticipated population changes for selected wildlife species are shown in Table 3-6 for each alternative. Black-tailed deer can adapt to a variety of cover conditions, so abundance is likely to be comparable under all alternatives. Under Alternative 1, 2 and 7, elk numbers would decline due to reductions in thermal cover, survival cover (see Glossary) and riparian travel routes, and increases in human harassment. More favorable conditions under the proposed action and Alternatives 3 through 6 would result in increased elk populations. Due to elimination of snags and decadent trees, woodpecker populations would also seriously decline under Alternatives 1, 2 and 7. Impacts on upland game are expected to be negligible under all alternatives, because plentiful habitat in the form of brushy openings and second growth forest would be available. Reductions in old growth under Alternatives 1, 2 and 7 would be extremely adverse to species finding optimum habitat in old growth.

Table 3-6 Probable Changes in Selected
Wildlife Populations During Next Five Decades

Animals	Existing Populations	Relative Population Changes by Alternative PA,5,6	1	2	3	4	7
Deer	High	0	0	0	0	0	0
Elk	Moderate	+	--	-	+	++	--
Woodpeckers	Moderate	-	--	--	-	-	--
Upland Game	High	0	0	0	0	0	0
Old-growth-related Species 1/	Low	-	--	--	-	-	--

+ = Beneficial - = Adverse 0 = None or Negligible

1/ See Appendix E for list of species.

Transportation System

New road construction would eliminate vegetation within rights-of-way. The acreage of habitat that would be eliminated is shown in Table 1-2. Wildlife-vehicle collisions would likely increase in proportion to miles of new road constructed. New roads would also likely increase poaching and hunter access, contribute to harassment of wildlife during stress situations (such as times of temperature extremes) and reduce elk use within one-half mile of roads (Perry and Overly 1977; Lyon 1979). Reduction in elk use would depend upon terrain, cover, distance from roads and other factors. Estimates of elk range that would be affected by road construction and use vary from about 55,040 acres in Alternative 4 to 66,560 acres in Alternative 1 (61,440 acres under the proposed action). Road construction would be most detrimental to wildlife under Alternatives 1, 2 and 7, least detrimental under Alternative 4 and moderately detrimental under the proposed action and Alternatives 3, 5 and 6. The proposed MFP includes a recommendation to close some roads in order to reduce harassment and poaching of big game.

Timber Harvest

Clearcutting would constitute the greatest impact on wildlife habitat during this decade. Acreage proposed for clearcutting is shown in Table 1-2 and Figure 3-1. Size and spatial orientation of clearcuts are important considerations in deer and elk management. Reynolds (1966) found that elk use in Arizona occurred primarily within 600 feet of the boundary between cover and forage areas. This corresponds to a circular forage area of 26 acres (Thomas 1979). However, a Montana study (Lyon 1976) suggested that openings up to 40 acres would be acceptable to elk. Bureau policy limits clearcuts to 40 acres unless special economic and environmental considerations dictate otherwise. Spatial orientation refers to the positions of clearcuts in relation to each

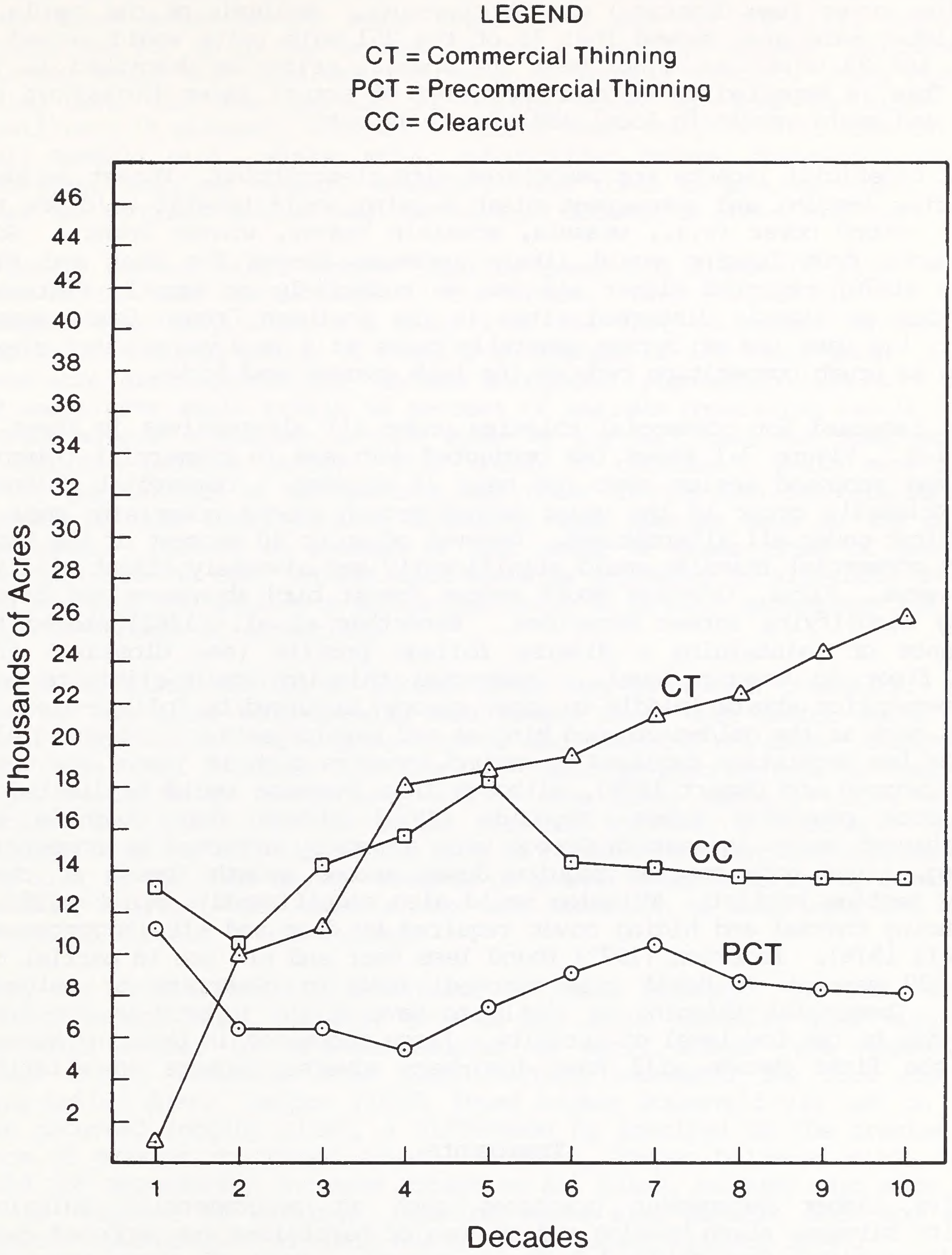


FIGURE 3-1
CLEARCUTTING AND THINNING BY DECADE:
PROPOSED ACTION

other. A spatial objective considered in the MFP was to retain tree cover around clearcut units for at least 15 years. This would allow for development of hiding cover (see Glossary) within clearcuts. Analysis of the sample 5-year timber sale plan showed that 18 of the 251 sale units would exceed 40 acres, and 93 units would not meet the spatial criterion described in the MFP. This is expected to be representative of actual sales throughout the decade and would result in localized adverse impacts.

Several beneficial impacts are associated with clearcutting. Forest residues left after logging and subsequent slash burning would benefit wildlife requiring ground cover (e.g., weasels, mountain beaver, winter wrens). Soil disturbance from logging would likely increase forage for deer and elk. Swanson (1970) reported higher elk use on moderately or heavily disturbed sites than on lightly disturbed sites in the southern Oregon Coast Range. However, big game use of forage generally peaks at 6 to 8 years after clearcutting as brush competition reduces the lush grasses and forbs.

Acreage proposed for commercial thinning under all alternatives is shown in Table 1-2. Figure 3-1 shows the projected increase in commercial thinning under the proposed action over the next 10 decades. Commercial thinning would primarily occur in the young second growth stages comprising most of the habitat under all alternatives. Removal of up to 40 percent of the basal area by commercial thinning would significantly and adversely affect wildlife in two ways. First, thinning would reduce forest bird abundance and diversity by simplifying forest structure. MacArthur et al. (1962) showed the importance of maintaining a diverse foliage profile (see Glossary) from forest floor to treetop level. Commercial thinning would eliminate some upper vegetation strata (middle to upper canopy) required by foliage-gleaning species such as the golden-crowned kinglet and hermit warbler. It would also increase low vegetation required by ground foragers such as juncos and sparrows (Franzreb and Ohmart 1978), although this increase would be limited by shade from remaining trees. Reynolds (1971) showed that Cooper's and sharp-shinned hawks in western Oregon were adversely affected by commercial thinning, since both species require dense second growth forest as their primary nesting habitat. Thinning would also significantly impact wildlife by reducing thermal and hiding cover required by deer and elk (Edgerton and McConnell 1976). Edgerton (1972) found less deer and elk use in partial cut areas (30 percent of basal area removed) than in clearcuts or unlogged stands. Commercial thinning is likely to have slight impacts in the first decade due to the low level of activity. Large increases in thinning acreage after the first decade will have long-term adverse impacts on wildlife.

Treatments

Intensive timber management practices such as precommercial thinning, mortality salvage, slash burning and the use of herbicides are proposed under most alternatives (see Table 1-2 for acreages). Many of these practices would adversely affect wildlife. Impacts would vary according to the amount of acres harvested and treated under each alternative.

Effects of precommercial thinning on wildlife populations have not been extensively studied, but general observations indicate some adverse impacts. Heavy slash accumulations would impede deer and elk mobility, restricting habitat use for up to two decades or until slash decomposed. Precommercial thinning would also diminish the value of densely stocked, young stands as hiding cover for deer and elk and nesting cover for some songbirds (e.g., MacGillivray's warbler). Increased ground cover would benefit some birds and small mammals (e.g., winter wren, rufous-sided towhee, Townsend's chipmunk, chickaree, mountain beaver, weasels). The trend in precommercial thinning under the proposed action over the next 10 decades is shown in Figure 3-1.

Mortality salvage would remove existing snags and eliminate live, decadent trees which would become snags in the future. Recent Salem District surveys revealed that only about 0.2 snags/acre are left on recent harvest units despite the current policy of leaving an average of 1.8 snags/acre. (About 3 snags/acre are required for maximum woodpecker population levels. Leaving 1.8 snags/acre would retain 60 percent of maximum population levels.) This already adverse situation is made worse by the fact that few snags are left on adjacent private lands. This trend, if continued, would severely restrict populations of woodpeckers and other cavity-dwelling wildlife (see Appendix E) and could locally eliminate some species such as the pileated woodpecker. Leaving an average of four snags or green trees of prescribed sizes per acre in each harvest unit would be necessary to alleviate the existing shortage and achieve a population level of primary excavators that is at least 60 percent of potential.

Impacts of slash burning on ground cover vary with burn intensity. Cooler burns on wet sites would remove less ground cover than hotter burns on dry sites. Removal of small ground cover and charring of larger branches and logs (more than 3 inches in diameter) would be detrimental to some birds (e.g., woodpeckers, chickadees) and to some small mammals (e.g., weasels, rabbits, deer mice) that use forest residues for food or shelter. Charring of large branches and logs would also be harmful to invertebrates, an important link in the food chain. Removal of downed woody material by burning and mortality salvage would cause a long-term reduction of this important habitat in managed forests of the future.

There are several beneficial effects of slash burning. In less than one growing season after burning, grasses and forbs normally grow vigorously, providing habitat for animals adapted to early stages (see Appendix D). Crouch (1974) indicated that slash burning increased the food supply of black-tailed deer. Harper (1969) found higher Roosevelt elk use on burned than unburned logging sites, a difference he ascribed to the greater abundance of grasses on burned areas. However, Harper believed slash burning would not necessarily increase forage on all sites, because each site varies in its response to burning. Burning would also benefit deer and elk by removing obstructions to their use of forage areas (Crouch 1974).

Mechanical piling of slash following scarification could result in soil compaction, damaging subterranean habitat used by burrowing mammals. Piling would remove downed slash that can hinder movements of deer and elk, but windrowed slash could result in large barriers.

Mountain beaver are trapped to reduce damage to young tree seedlings. During the first decade under the proposed action, trapping would be used to control mountain beaver on an estimated 1,900 acres. Nontarget species such as long-tailed weasels, skunks and squirrels comprise about 6 percent of the catch. Eliminating small numbers of nontarget animals by trapping would have localized impacts but would be of little overall significance.

Four major types of wildlife impacts are associated with silvicultural herbicide application: exposure to toxic chemical levels, exposure to chronic levels, habitat modification and carrier impacts. A brief discussion of these impacts follows. For more information refer to the final EIS on herbicides (USDI, BLM 1978b) and final EIS South Coast Curry (USDI, BLM 1980f).

Exposure to acute toxicity levels of herbicides, resulting in immediate death, is not anticipated as none of the herbicides proposed for use are highly toxic to wildlife when used as manufacturer labels prescribe.

Chronic (long-term) effects upon wildlife from herbicides proposed for use are generally unknown. Adverse impacts from chronic poisoning are not anticipated, however, because the proposed use rate renders it unlikely that individual animals would be exposed to repeated treatments.

Herbicides significantly modify wildlife habitat. They kill or suppress plants in competition with conifers, reducing vertical and horizontal stratification of vegetation. Wildlife (e.g., MacGillivray's warbler, Wilson's warbler, willow flycatcher, deer, elk) requiring dense, young forests of diverse species would be adversely affected by reduced habitat diversity.

Diesel oil is often used as a carrier for forest herbicides. Data on the toxicity of diesel oil to wildlife are limited, although adult ducks are known to be adversely affected (Hartung 1965, 1966; Tucker and Crabtree 1970). Wildlife would not likely consume lethal amounts of the carrier because of the dilution factors involved. The carrier may, however, adversely affect forage palatability.

The proposed action and all alternatives except 6 call for herbicide use in site preparation and conifer release. The proposed action and Alternatives 1, 2, 3 and 5 would have the greatest adverse impact on wildlife. Herbicide use would have a moderately adverse impact on wildlife under Alternatives 4 and 7.

Fish

Timber management activities can impact fish and aquatic habitat by causing changes in the abundance and/or condition of bottom materials, woody materials, streamflows, food sources, water temperatures, channel configuration, fish passage and water chemistry. Chapter 3, Impacts on Soils and Water Resources, provides data on existing and expected amounts of sediments, organic matter and streamflows in the SYUs. Many analyses and conclusions appearing in this section are based on those data.

To avoid or minimize timber management impacts on aquatic habitat, the Bureau employs a number of protection and mitigation measures. Buffer strips (see Glossary), stream cleaning, equipment restrictions and habitat improvement projects are typical of past efforts. The proposed action and alternatives provide a wide range of protection and mitigation possibilities. For example, Alternative 4 is most protective, allowing no riparian zone disturbance on second order and larger streams. Least protective is Alternative 1, which provides for brush, hardwood and in some cases, coniferous vegetation in streamside buffers.

Table 3-7 shows changes in coldwater fish habitat that are likely to occur under the proposed action and alternatives.

Table 3-7 Probable Changes in Fish Habitat
Conditions During Next Five Decades

Habitat Factors	Existing Habitat Conditions[1]	Relative Changes by Alternative					
		PA,5,6	1	2	3	4	7
Bottom materials	Fair	+	-	0	+	+	0
Woody materials	Poor	+	0	0	+	++	-
Streamflows	Fair	0	-	0	0	+	0
Food production	Fair	+	--	0	+	++	-
Water temperature	Fair	+	-	0	+	++	-
Channel configuration	Fair	+	-	0	+	+	-
Fish passage	Fair	0	-	0	0	+	0
Water chemistry	Good	0	-	0	0	0	0
All	Fair	+	-	0	+	+	-

+ = Beneficial - = Adverse 0 = None or Negligible

[1] Subjective estimates based on comparisons with undisturbed streams and riparian zones.

Bottom material (boulders and gravel) with a minimum of sediments (see Glossary) is essential to the health of fish populations. In the SYUs, excessive amounts of sediment in fish habitats result from natural events such as landslides, but are mainly caused by surface-disturbing activities near water (see Chapter 3, Impacts on Soils and Water Resources). Excessive sediments directly affect fish by reducing aquatic food sources and by cementing or covering gravel. This reduces dissolved oxygen and eliminates or reduces spawning, incubation and rearing of young fish. According to Gibbons and Salo (1973), excessive sediments have the greatest impact of all factors affecting aquatic life.

Under Alternative 4, sedimentation would be reduced by maximum protection of fragile soil areas and by retention of riparian zones on all second order and larger streams. Alternative 1, which has minimal provision for undisturbed buffers, would increase sediments compared to present levels. Therefore, fish populations would be expected to decline. The proposed action and Alternatives 2, 3, 5, 6 and 7 would be less protective of fragile soils and riparian zones than Alternative 4, but would not increase sediments over present levels except in some localized stream reaches.

In the SYUs, large trees fall into streams, and many of those remaining in channels provide needed habitat for fish. When large trees (primarily conifers greater than 100 ft. in height) in riparian zones are removed by logging, sources of instream woody structure are reduced. As structure is reduced, gravel deposits, pools, escape cover (see Glossary) and bank and channel stability diminish. Under these conditions, fish populations decline. The proposed action and all alternatives except 1 provide varying degrees of riparian zone protection, thereby assuring a continual replenishment of structure in streams inhabited by fish. Under Alternative 1, which makes no provision for riparian zone protection, woody structure would decline to the detriment of fish populations.

Aquatic and terrestrial invertebrates (mainly insects) are the major food sources for young salmon and trout. According to Erman et al. (1977), buffer strips at least 30 meters (about 100 feet) wide on each side of streams are required to maintain insect populations. Insects falling from multistoried vegetation are widely dispersed over adjacent water, providing a constant and plentiful source of food. Repeated road crossing failures cause significant disruptions to invertebrate communities, according to the same research. The greatest reductions of food sources due to removal of large trees in riparian zones would occur under Alternatives 1 and 7.

Water temperatures are critical for optimum fish production. Reduction of riparian zone vegetation in the SYUs has increased summer and decreased winter water temperatures, thereby reducing fish populations. High summer water temperatures can lower dissolved oxygen, increase the incidence of fish disease, block upstream fish passage, overcrowd juvenile rearing areas and reduce food production. Low winter water temperatures can slow egg incubation. The greatest reductions in water temperatures due to reduced riparian zone vegetation would occur under Alternatives 1 and 7.

Channel configurations (pool/riffle ratio, pool quality, stream depth and stream width) have changed to the detriment of fish populations in the SYUs. This change has affected fish through elimination of space and cover used by young fish and adult resident fish (Reiser and Bjornn 1979). Impacts on channel configurations due to removal of large trees in riparian zones would be greatest under Alternatives 1 and 7.

In the SYUs, landslides and excessive logging debris in streams have reduced fish populations by blocking fish passage and lowering water quality (particularly dissolved oxygen). The proposed action and other alternatives are not expected to add excessive amounts of logging debris to streams. Under all alternatives, landslides from old and new roads would cause short-term fish passage impacts.

The chemicals proposed for use in vegetation control, at their levels of application, are not expected to significantly affect fish or their habitat. Proposed application rates are well below known lethal doses for laboratory tested species, and toxic effects are not expected. In a worst case, streamside vegetation that provides shade could be altered, but this is unlikely due to the protection of buffer strips (see USDI, BLM 1978b for more detailed information). Impacts on fish from chemical applications are expected to be similar under the proposed action and all alternatives.

The condition and trend of individual habitat components have a direct bearing on fish populations. If all components are adequately protected, fish populations will be maintained and will probably increase over existing levels. If one or more components are severely impacted, fish populations will remain below potential levels.

Table 3-8 shows relative changes in trout and salmon populations anticipated under the proposed action and alternatives.

Table 3-8 Probable Changes in Cold Water Fish Populations
During Next Five Decades

Species	Existing Population Levels 1/	Relative Changes by Alternative PA,5,6	1	2	3	4	7
Cutthroat	Moderate	+	-	0	0	++	-
Steelhead	Moderate	+	-	0	+	+	0
Chinook	Moderate	0	-	0	0	+	0
Coho	Low	+	-	0	+	+	0
Sockeye	Low	0	0	0	0	0	0
All	Moderate	+	--	0	0	++	0

+ = Increase - = Decrease 0 = None or Negligible

1/ Subjective estimates based on comparisons with the amount of fish streams could be expected to support if habitats were maintained in undisturbed condition.

Under existing conditions, streams in the SYUs are considered to be producing fish at 57 percent of potential levels. The proposed action and Alternatives 4, 5 and 6 would increase fish production to between 60 and 75 percent of potential by the fifth decade. Fish production would remain nearly the same under Alternatives 2, 3 and 7 and would decrease to 20 percent of potential under Alternative 1.

Analysis of the sample 5-year timber sale plan indicates approximately 5 miles of road would be built on fragile or unstable soils adjacent to streams with fishery values. This could cause increases in sedimentation, resulting in significant adverse impacts to adjacent and downstream fish habitat. New roads in the sample 5-year timber sale plan would cross 97 streams with fishery values. Twenty-five roads would cross headwall areas, possibly causing local short-term and long-term adverse impacts. Approximately 20 miles of streams supporting fish run through or adjacent to 78 harvest units outlined in the sample plan. Since riparian zones would be protected, these streams are not likely to be significantly impacted.

Threatened and Endangered Animals

Threatened and endangered species receive protection under terms of the Endangered Species Act of 1973 (as amended) and BLM policies and guidelines. Analysis of impacts on these species is restricted to the northern spotted owl, because data on the existence of other threatened and endangered species are limited. Present data indicate no impacts on other threatened and endangered species. Future timber management EAs will consider impacts to other threatened and endangered species and identify measures to protect their habitat.

Transportation System

Construction of new roads could adversely affect the spotted owl by eliminating habitat and increasing human disturbance in previously inaccessible areas.

Timber Harvest

Harvesting of already scarce old-growth stands would decrease spotted owl populations in the SYUs. The Oregon Endangered Species Task Force (comprised of representatives from the USFS, BLM, USFWS, ODFW and OSDF) recommended retention of a 300-acre old-growth core area for each owl pair and an additional 900 acres of adjacent foraging/replacement habitat managed to provide half the acreage in 30+ year-old forests. Recent proposed revisions in Task Force recommendations call for 1,000 acres of old growth per pair within a radius of 1.5 miles from the nest site. These revisions are still under study and have not been adopted. Depending upon which Task Force recommendation is applied, protection of the 29 known spotted owl locations would vary by alternative as shown in Table 3-9.

Table 3-9 Number of Spotted Owl Locations Protected Based on Previous and Proposed Revised Recommendations

	Locations Protected			
	300+900 acres/location		1,000 acres/location	
Alternative	1st Decade	5th Decade	1st Decade	5th Decade
PA,5,6	10	13	2	5
1	0	0	0	0
2	5	7	0	2
3	10	13	0	3
4	9	12	0	8
7	1	2	1	2

Conclusions

Overall impacts on wildlife habitat would depend upon the alternative selected. Alternatives 1, 2 and 7 would reduce habitat diversity in the SYUs by generally restricting the amount of old growth, mature conifers and riparian habitat while increasing pole/sapling and young second growth stands. Pole/sapling and young second growth habitats have relatively simple structure even under natural conditions, and practices such as slash burning, thinning and brush control would further reduce their diversity. The proposed action and Alternatives 3, 4, 5 and 6 would retain habitat diversity in the SYUs by maintaining some old growth, mature conifers and riparian habitat.

Deer and upland game numbers are expected to be stable under all alternatives. Numbers of elk would increase under the proposed action and Alternatives 3 through 6. Under all alternatives, old-growth-related species and woodpeckers would decline. The greatest number of spotted owl locations would be protected under the proposed action and Alternatives 3, 4, 5 and 6. Adoption of Alternative 1 would probably eliminate the spotted owl from BLM-administered land in the SYUs.

Cumulative effects on the northern spotted owl are difficult to predict, as planning efforts by land managing agencies are just beginning. At present, only the Medford District of BLM is committed to plans of action. Following original Task Force recommendations, their plans target 14 pairs of northern spotted owls for habitat protection. Should the Salem District accept the minimum pairs proposed and other BLM Districts and land managing agencies not provide for the recommended numbers, then the species would certainly be in danger and would be considered for Federal status.

Conversely, if other agencies and BLM Districts except Salem follow Task Force recommendations, the loss of Salem's pairs, while leaving a gap in the population distribution, would probably not jeopardize the spotted owl population as a whole.

Changes in fish habitat and populations in the SYUs would be most adverse under Alternatives 1 and 7 and would be beneficial under the proposed action and Alternatives 4, 5 and 6. Beneficial changes would result primarily from more protective management practices. Adverse changes would result from logging on fragile sites and in riparian zones.

IMPACTS ON RECREATION

The primary impacts of timber management on recreation are related to changes in physical setting and resource availability. Both types of change can affect levels and patterns of visitor use and opportunities for desired recreation experiences (see Glossary). For example, recreation use of some areas might be facilitated by new road construction. On the other hand, visitation may temporarily or permanently decline if an area's setting or resource availability is altered to the point where desired recreation experiences can no longer be realized. Anticipated changes in major recreation activities and opportunities are displayed by alternative in Table 3-10.

Under Alternatives 2, 4 and 7, timber management would be excluded from all developed recreation sites and all sites identified as having development potential. Buffers are or would be provided at each site. Adverse impacts would be negligible, and future needs for facility-oriented activities would be accommodated. Alternative 1 would allow timber management activities on all sites with development potential and within buffers at all but one existing site (Sandy Oxbow County Park). These activities would create adverse visual and audible impacts and degrade the recreation experience for some facility users. In addition, Alternative 1 would not protect potential for new facility development and would not accommodate future needs. The proposed action and Alternatives 3, 5 and 6 would provide for timber harvest within some sites with development potential, restricted harvest in some buffers and minimal development of new facilities. With this level of timber management, some future recreation needs would not be accommodated by BLM under these alternatives.

Table 3-10 Probable Changes in Recreation Activities and Opportunities During Next Five Decades[1]

Activities	Existing Conditions	Relative Changes by Alternative					
		PA,5,6	1	2	3	4	7
Facility Oriented							
Camping/Picnicking (existing and potential)	Good	-	--	0	-	0	0
Hiking/Horse Riding (existing and potential)	Fair	+	--	0	+	++	0
Sightseeing (potential)	Good	0	--	0	0	0	0
Non-Facility Oriented							
Hunting (big game)	Fair	+	-	-	+	++	-
Fishing	Fair	+	--	-	0	+	-
ORV Driving	Good	0	0	0	0	0	0
Other[2]	Good	0	0	0	0	0	0

+ = Beneficial - = Adverse 0 = None or Negligible

[1] See Appendix J for primary criteria used to determine change ratings.

[2] Includes dispersed activities such as collecting, rockhounding, camping, picnicking, upland game hunting and general sightseeing. Degree of change may vary between these activities under any one alternative. This table rates the collective changes for these activities.

Under Alternative 4, timber management would be excluded from all existing trails, four potential trails and all trail buffers. Visual and audible impacts would be minimal, future demands for trail hiking and horse riding would be substantially met, and quality recreation experiences desired by many trail users could be attained.

The proposed action and Alternatives 3, 5 and 6 would provide for construction of two new trails (Columbia River Gorge and Elkhorn Creek). Existing and new trails would have buffers of varying widths and would be subject to restricted entry, e.g., road crossings. Some future needs would not be accommodated by BLM under these alternatives. There is no provision in the proposed action for protecting the potential Green Peter Peninsula and Quartzville Creek-Crabtree Mountain Trails. Alternative 1 has no provision for new trails or for buffers on existing trails. Existing trails would be subject to relocation as required to accommodate timber management activities. These activities would create high adverse visual and audible impacts and would degrade the recreation experience for most trail users. Alternative 1 would not accommodate future trail needs. Alternatives 2 and 7 are similar to Alternative 1 except that buffers of varying widths would be provided on existing trails. Most trails would be subject to impacts by restricted timber harvesting and road construction.

Under Alternative 4, all special sightseeing locations and their buffers would be excluded from timber management. Under all other alternatives except 1, some timber management would occur in buffers, creating negligible adverse impacts on primary sightseeing resources. Alternative 1 has no provision for protection or development of any special sightseeing values.

Impacts of timber management on non-facility oriented (i.e., dispersed) recreation activities would be beneficial or adverse, depending on the alternative and/or activity involved. Road construction and timber harvest would open new areas for ORV use under all alternatives, though increases would be negligible relative to existing opportunities. Under all alternatives, dispersed camping and picnicking locations may be directly impacted (e.g., by harvest of areas used). However, substitute areas would be available on other BLM-administered forest lands.

Impacts to fishing and big game hunting are primarily dependent upon impacts to animal populations (see Chapter 3, Impacts on Animals). Under Alternative 1, opportunities for fishing would be severely impacted, because fish populations would decline. Under the proposed action and all other alternatives, fish populations would gradually increase, but not enough to meet future demands for sport fishing. Localized alterations to stream settings would occur under all alternatives, but would be greatest under Alternatives 1, 2 and 7. These alterations would degrade desired recreation experiences for some anglers.

Future demand for upland game and deer hunting is expected to be met under all alternatives, but elk hunting opportunities would vary. Substantial decreases in elk populations on BLM-administered land under Alternatives 1 and 7 would create moderately adverse impacts to big game hunting. Slight decreases in elk populations, with corresponding impacts, would occur under Alternative 2. Moderate increases in elk populations under the proposed action and Alternatives 3, 5 and 6 would benefit this activity. Major increases in elk populations under Alternative 4 would provide the greatest benefit.

The Table Rock and Green Peter Peninsula/Quartzville Creek areas would be designated and managed as recreation lands under Alternative 4 with timber management excluded. The proposed action and Alternatives 5 and 6 provide for recreation lands on Green Peter Peninsula (Quartzville Creek area excluded). Under these alternatives, recreation resources in the Table Rock and Quartzville Creek areas would be partially protected by ACEC and other less formal designations (e.g., fragile sites, riparian zones and VRM classes). Timber harvest near Table Rock Trail would be limited to 10 percent removal per decade, and haul roads would be closed when not in use. Moderate adverse impacts from timber harvest and road construction near the trail would occur. Alternatives 1, 2, 3 and 7 would not protect the potential for designation of any recreation lands. With the exception of 1, partial protection would be realized through less formal designations. Much of the Table Rock area would be subject to full timber management under Alternatives 1, 2 and 7, which would substantially degrade desired recreation experiences for most trail users. Timber management under Alternative 3 would be restricted to 5 percent removal per decade within portions of both the Table Rock area and Green Peter Peninsula.

Impacts on three potential Outstanding Natural Areas, Sandy River Gorge, Soosap Meadows and Table Rock (within proposed Table Rock Recreation Lands), are discussed in Chapter 3, Areas of Critical Environmental Concern.

Alternative 4 fully protects BLM-administered land within a quarter-mile of segments of five rivers (Sandy, Salmon, Clackamas, North Santiam and South Santiam) which are potential national scenic or recreational rivers and/or State Scenic Waterways. Under Alternative 1, significant values associated with the five river segments would be subject to high adverse impacts from road construction and/or timber harvest within riparian zones. The Sandy River State Scenic Waterway would not be subject to timber management under any alternative except 1. Under all alternatives except 1 and 4, timber harvesting and road construction outside of riparian zones, but within a quarter-mile of the other rivers, could create low to high adverse visual and audible impacts. These impacts may be out of character with the rivers' settings. Potential timber management impacts within a quarter-mile of these rivers would be analyzed in environmental assessments which precede each action. If site-specific analysis determines that a proposed sale would adversely affect a river's outstanding values, BLM would consult with the State of Oregon and the National Park Service to develop appropriate mitigation measures.

Table 3-11 shows estimated recreation visitation in 1990 under the proposed action and alternatives.

Impacts of the sample 5-year timber sale plan on specific recreation resources are displayed in Table 3-12. Most sites and areas would be protected by buffers. However, slightly adverse ratings are given for short-term audible impacts and minor visual impacts created by timber harvest adjacent to buffers or by limited road construction and yarding through buffers. All designated and potential State Scenic Waterways and the three river segments identified under the Nationwide Rivers Inventory as potential national scenic or recreational river candidates would not be impacted under the sample 5-year sale plan.

Conclusions

Alternative 4 would provide the most benefits for recreation. Except for area-wide fishing, recreation needs would be fully met. The greatest adverse impacts on recreation would occur under Alternative 1, with severe degradation of most recreation experiences and only nominal provisions to accommodate future needs. Under the proposed action and Alternatives 2, 3, 5, 6 and 7, adverse impacts to recreation sites and resources would occur to varying degrees. Some facility needs would not be accommodated, and demand for some recreation opportunities would not be met. Adverse impacts would be greater under Alternatives 2 and 7 than under the proposed action and Alternatives 3, 5 and 6.

Table 3-11 Estimated Recreation Visitation (1990)

Visitor Days/Year

			Alternatives					
Activity	1975 Visitation	1990 Visitation Projection1/	PA, 5,6	1	2	3	4	7
Hunting2/	10,400	11,700	11,900	11,500	11,600	11,800	12,200	11,500
Fishing2/	22,400	24,800	23,500	16,600	23,000	23,400	25,700	22,900
Other Recreation3/	276,000	341,000	348,000	286,000	314,000	334,000	357,000	306,000
Total	308,800	377,500	383,400	314,100	348,600	369,200	394,900	340,400

1/ Based on assumption of no change in physical environment.

2/ Differences in hunting and fishing estimates are primarily a result of expected impacts on animal populations.

3/ Includes all other activities shown in Table 2-9 except hunting and fishing. Estimates for general recreation use are based on changes in physical setting and recreation resource/ facility availability and on the magnitude of recreation experience, degradation or enhancement.

Source: USDI, BLM 1980b; Salem District personnel.

Table 3-12 Potential Impacts of the Sample 5-Year Timber Sale Plan on Recreation

Activities and Resources	Quality Rating[1]	Number of Harvest Units with Potential Impacts	Overall Impacts on Localized Visitor Use
Fishing[2]			Slightly adverse
Little Sandy River	A	1	
Gordon Creek	B	2	
Eagle Creek	A	1	
Little Eagle Creek	B	3	
South Fork Clackamas R.	B	2	
Clear Creek	B	4	
Lukens Creek	B	3	
Butte Creek	A	4	
Molalla River	A	2	
Table Rock Fork, Molalla R.	B	1	
Dead Horse Canyon Creek	B	8	
Abiqua Creek	A	1	
Thomas Creek	B	6	
Hamilton Creek	B	1	
Scott Creek	B	1	
Crabtree Creek	B	1	
West Fork Whitcomb Creek	B	1	
East Fork Whitcomb Creek	B	1	
Moose Creek	B	1	
Yellowstone Creek	B	4	
Sightseeing			Slightly adverse
Lukens Creek Loop Drive	A	3	
Yellowstone Access Road	A	2	
Quartzville Creek Drainage Old-growth Area	B	3	
Crabtree Creek Drainage Old-growth Area	B	5	
Gates Elk Herd	A	2	
Church Creek Beaver Colony	B	1	
Thomas Creek Elk Herd	A	1	
Galena Ridge Basalt Cliff	B	1	
South Fork Clackamas River Canyon	B	1	
General Leisure			Slightly adverse
Table Rock Trail		2	

[1] Quality ratings are as follows: A = high, B = moderate and C = low. They are determined in accordance with BLM Manual 6111.

[2] Impacts on localized fishing opportunities focus on stream segments to be managed for improving quality or increasing use. The quality rating is based on the sport fish species which provides the best fishing opportunities. Chapter 3, Impacts to Animals, Fish, provides further insight into sport fishing within the SYUs.

IMPACTS ON CULTURAL RESOURCES

Complete field surveys of the SYUs to identify cultural sites have not been undertaken. However, cultural resource surveys will precede each specific timber management action that would result in ground disturbance (BLM Manual 8100, Cultural Resource Management). Some sites may remain undiscovered even after surveys have been completed.

Table 3-13 shows changes from present conditions of cultural resource sites that might result from timber management under the proposed action and alternatives.

Table 3-13 Probable Long-Term Changes in Cultural Resource Conditions

	Existing	Relative Changes by Alternative					
Sites	Conditions	PA,5,6	1	2	3	4	7
National Register Listed or Eligible							
1. Table Rock Trail	Good	- 1/	-- 1/	- 1/	- 1/	0	-- 1/
2. Barlow Road	Good	0	- 2/	0	0	0	- 2/
3. Rock Corral	Good	0	- 2/	0	0	0	- 2/
Other Known Sites	Fair	0	- 3/	0	0	0	- 3/

+ = Beneficial - = Adverse 0 = None or Negligible

1/ Possible impacts to site and visual setting

2/ Possible impacts to visual setting

3/ Sites subject to ground disturbance or disruption after appropriate data recovery

Under the proposed action and all alternatives, protection would be provided in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR Part 800).

Under Alternative 4, all known cultural sites would be fully protected from ground disturbance. Under the proposed action and all alternatives except 4, Table Rock Trail, which has been determined eligible for the National Register, probably would be impacted at one point by a road crossing. Under the proposed action and Alternatives 2, 3, 5 and 6, the remaining known cultural sites on public land would be fully protected from ground disturbance.

Under Alternatives 1 and 7, sites (except Table Rock Trail) listed on or determined eligible for the National Register would be protected from ground disturbance, though impacts to their visual settings would occur. Appropriate measures for data recovery would be carried out for all other cultural sites prior to disturbance.

Cultural resources not discovered by field survey could be inadvertently impacted under the proposed action and all alternatives. The potential for damage would depend on the amount of timber harvested per decade under each alternative. Damage could occur through soil compaction, soil movement, fire or mixing of organic matter. Soil compaction and soil movement could damage artifacts and disrupt relative positions of cultural materials. Uncovering sites could also increase the possibility of illegal artifact collecting. Fire during slash disposal and site preparation could chemically alter cultural deposits, destroy combustible items and damage stone and ceramic artifacts. The mixing of organic matter could contaminate Carbon 14 dating samples, making them unreliable for scientific analysis.

It is not possible to estimate the number of undiscovered sites that could be impacted. In the worst case, impacts to a site would completely obliterate structural remains and subtle indications of prehistoric activity. The top 20 inches of prehistoric sites with subsurface deposits would be severely impacted.

Road construction under the proposed action and alternatives would provide additional access to known cultural sites, resulting in increased visitation. Vandalism, theft and site erosion could result. Esthetic, recreational, interpretive and educational qualities of the sites could be degraded. Road construction and/or timber removal on slopes above sites could result in increased rates of erosion and soil slumpage onto sites. These adverse impacts would be most likely to occur under Alternatives 1 and 7 and least likely under Alternative 4.

The landscape and vegetation surrounding a cultural site which compose its visual setting may be impacted by timber harvesting and road construction. Such impacts could reduce the site's esthetic appeal for recreation, interpretation and education. Impacts to the visual settings of cultural sites would be most likely under Alternative 1 and least likely under Alternative 4. Analysis indicates that no significant visual setting impacts would occur as a result of timber sales proposed in the sample 5-year timber sale plan. Site-specific analyses of additional sales will be included in the environmental assessments which precede each timber management action.

Conclusions

Appropriate measures would be taken to identify and protect cultural sites prior to ground-disturbing activities under the proposed action and all alternatives. Undiscovered cultural sites would be susceptible to damage from artifact breakage or destruction, displacement of materials and contamination of organic matter. Once a site is found, however, mitigation measures would be taken to minimize or avoid future damage. Under the proposed action and Alternatives 2 through 6, sites newly discovered before logging would be managed to protect scientific and/or interpretive values.

Under Alternatives 1 and 7, sites listed on the National Register (except Table Rock Trail) would be protected from ground disturbance, although their visual settings may be altered. Table Rock Trail, determined eligible for the National Register, probably would be directly impacted by a road crossing. Appropriate measures for data recovery would be developed for all other sites. Data recovery may result in an irretrievable loss of some information as a result of not protecting sites until new methods for recovery and analysis are formulated.

IMPACTS ON VISUAL RESOURCES

Clearcutting, road construction and most other timber management practices change vegetative patterns, alter species composition, disrupt the land surface and thereby cause visual impacts. The severity of a visual impact depends on many factors including location, number, size and shape of clearcut units; location and design of proposed roads; yarding methods; amount and treatment of logging and road construction debris; and success of vegetative reestablishment in disturbed areas. The visual resource management (VRM) class is also important in determining impacts, because VRM classes are based upon an area's overall scenic quality, sensitivity level and distance zone (see Glossary).

In developing the proposed action and alternatives, some VRM classes shown in Figure 2-3 were reclassified to resolve conflicts between timber management, visual resources and other resources. Reclassifications were either downgrades (e.g., Class II to III or IV) or upgrades (Class II to I). Downgrading of VRM classes increases the potential for adverse visual impacts. For example, Class IV VRM standards applied to lands downgraded from Class II might not adequately protect scenic values because VRM IV standards are less restrictive on management activities. Consequently, the long-term effect of downgrading might be to lower scenic quality in downgraded and adjacent areas. Nevertheless, the Bureau's ability to affect an area's overall scenic quality is often limited by intermingled land ownership patterns (see Figure 1-1). In some situations, visual impacts resulting from timber management activities on public lands might be consistent with visual impacts resulting from activities on surrounding lands. Therefore, downgrading and the consequent effects on overall scenic quality of BLM timber management activities might be negligible.

Table 3-14 shows, for each VRM class, probable long-term changes in visual resource conditions (scenic quality) under the proposed action and each alternative. Under Alternatives 1 and 7, existing visual resource conditions would deteriorate. Except for some Class I and II areas under Alternative 7, clearcuts and road construction would occur in highly scenic and sensitive areas, and the visual impacts of timber management activities in other areas would not be mitigated. Adverse visual impacts would also occur under Alternatives 2 and 3. Under Alternative 2, impacts would be highest in areas downgraded from Class II, and visual values in VRM IV areas would receive no consideration. Under Alternative 3, adverse impacts would primarily occur in Class III areas.

Under Alternative 4, visual resource conditions would improve. Adverse visual impacts in highly scenic and sensitive areas would not occur or would be mitigated. Under Alternative 4, all waterfalls would be protected, old-growth timber in VRM I, II and III areas would be increased, downgrading would not occur, and VRM class standards would be very high.

Table 3-14 Probable Long-Term Changes in Visual Resource Conditions

Existing Situation		VRM Class Acreage[3] and Changes in Condition[4]					
VRM Class[1]	Acres & Condition[2]	PA,5,6	1	2	3	4[5]	7
I	7,200 Good	8,200 0	0 --	8,000 0	7,500 0	7,200 0	3,000 --
II	23,100 Good	9,100 -	0 --	3,600 --	15,100 0	23,100 +	1,500 --
III	39,700 Fair	20,500 -	0 --	16,300 -	18,900 -	39,700 +	0 --
IV	89,900 Fair	122,100 +	0 -	0 -	118,400 +	89,900 +	0 -

+ = Beneficial   - = Adverse   0 = None or Negligible

[1] Classifications per BLM Manual 8400 (see Chapter 2, Visual Resources, and Figure 2-3).

[2] Conditions (Good, Fair, Poor) determined by an inventory and evaluation of the scenic quality in the SYUs.

[3] VRM class (Existing Situation) acres with acreage adjustments made in each class for reclassified (downgraded or upgraded) areas.

[4] Ratings of change (+, -, 0) are not solely based upon changes in acreage from the existing situation. Ratings represent the anticipated effect of timber management on existing visual resource conditions, taking into consideration (1) VRM objectives for the areas remaining in the class (acres shown); (2) possible effects of downgrading and upgrading (acres not shown); and (3) characteristics and uses of adjacent lands (intermingled land ownership patterns).

[5] Under this alternative, VRM class acres (Existing Situation) would not be downgraded or upgraded.

Under the proposed action and Alternatives 5 and 6, many highly scenic and sensitive areas would be protected, and visual resource values would be considered when planning timber management activities. However, adverse visual impacts would occur and would be highest in Class II and III areas. Visual impacts could result from clearcutting around some waterfalls, applying herbicides (except under Alternative 6) and removing some old-growth timber in Class II and III areas. Additionally, the scenic quality in areas with downgraded VRM classes might be lowered.

Table 3-15 shows probable changes in visual resource conditions under the sample 5-year timber sale plan.

Table 3-15 Probable Changes in Visual Resource Conditions
Under the Sample 5-Year Timber Sale Plan

VRM Class[1] Existing Situation	Name of Area	County	Clearcut Units Within Area	Probable Change [2]
I	Dead Horse Falls	Clack.	1	-
	Soosap	"	1	0
	Table Rock	"	2	0
	Triple Falls	Marion	1	-
	Cisco Falls	Linn	1	-
	Yellowstone Falls	"	4	--
II	Mt. Hood Highway 26	Clack.	3	0
	Molalla River Road	"	1	0
	Sawtell Road	"	7	0
	Butte Creek Road	"	4	-
	Little North Santiam Road	Marion	2	0
	Quartzville Access Road	Linn	10	-
III	Bornstedt Road	Clack.	1	0
	Smith Road	"	4	0
	Springwater Road	"	8	0
	Redland and Ridge Roads	"	2	-
	Howards Mill Road	"	1	0
	Hult Road	"	1	-
	Cox Road	"	1	-
	Divide Ridge Road	"	2	0
	Middle Fork Molalla Road	"	3	0
	Table Rock Access Road	"	5	-
	Sawtell Road	"	1	0
	Evans Mt. Road	Marion	3	0
	Fox Valley Road	"	2	-
	Thomas Creek Road	Linn	2	0
	Neal Creek Road	"	5	-
	Green Mt. Road	"	5	-
	Yellowstone Access Road	"	22	-
IV	All other unit locations		149	0

+ = Beneficial - = Adverse 0 = None or Negligible

[1] Classifications per BLM Manual 8400 (see Chapter 2, Visual Resources, and Figure 2-3).

[2] Change ratings represent anticipated effects upon the overall scenic quality of the area (non-site-specific) caused by the clearcut units (location, number, size, shape, etc.) Site-specific visual impact assessments will be made along with recommendations for mitigation (if needed) when individual timber sales are proposed.

In VRM I areas listed in Table 3-15, the combined visual impact is expected to be moderate. Clearcuts will be seen from some waterfalls where natural conditions now exist. In Class II areas, the combined visual impact is expected to be low. Portions of some clearcut units in VRM II areas will be seen from a few viewpoints along some of the roads. None of the 27 clearcuts are adjacent to roads listed in the table. In Class III areas, the combined visual impact is expected to be moderate. Clearcutting will be seen from some county roads in rural residential locations and from major logging access roads used by recreational and other traffic. Two of the 68 units in Class III areas will be adjacent to county roads. In VRM IV areas, the combined visual impact is expected to be negligible. The average size of the 149 clearcut units in VRM IV areas will be approximately 24 acres. These clearcuts will occur in low sensitivity areas seldom seen by most people. Additionally, many of the areas are intermingled with previously harvested lands and with lands where forest management activities are ongoing.

Conclusions

Alternative 4 would provide the highest level of protection for visual resources. Scenic and sensitive areas would be protected and the scenic qualities of public lands in all VRM classes would be maintained or improved. Under Alternative 3, overall adverse visual impacts would be low. Most scenic and sensitive areas would be protected. Under the proposed action and Alternatives 5 and 6, overall visual impacts would be moderate. Many highly scenic and sensitive areas would be protected, and the scenic qualities of some downgraded VRM II and III areas might be lowered. Under Alternatives 1, 2 and 7, overall visual impacts would be high. Visual resource values in all classes would receive no timber management considerations under Alternative 1. Even though some highly scenic and sensitive areas would be protected under Alternatives 2 and 7, results of substantial class downgrading would allow timber management activities that might lower scenic qualities in many areas.

IMPACTS ON AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Timber management impacts on potential Areas of Critical Environmental Concern (ACECs) or on areas with other current or prospective special designations would vary depending upon management prescriptions proposed under each alternative. (Original land use alternatives did not include ACECs.) Table 3-16 depicts anticipated changes in existing conditions by alternative.

Alternative 4 permits no timber harvest, road construction or treatments within the areas as originally nominated (see Table 2-10). Under this alternative, resources would be protected, and vegetation buffers would be retained. Alternative 1 has no provision for any protective designations, and most ACEC values would be lost.

Under the proposed action and Alternatives 2 through 7, BLM-administered land in Columbia River Gorge, Sandy River Gorge and Middle Santiam Terrace would remain unharvested. Under all of these alternatives except 7, Carolyn's

Crown would remain unharvested. Under the proposed action and Alternatives 5 and 6, the three remaining areas would be managed by protecting primary zones (areas containing critical resource values) and allowing timber harvest at the rate of 10 percent removal per decade (minimum harvest age of 100 years) in surrounding buffer zones. In the worst case, timber removal in buffer zones could cause changes in primary zone vegetation. Alternative 3 would allow harvest at 5 percent removal per decade in the buffer zone of the potential Table Rock ACEC. Under Alternatives 2 and 7, Williams Lake, Soosap Meadows and Table Rock primary zones could be adversely affected by adjacent timber management activities. In some cases, activities could occur within primary zones (i.e. no protective designations would apply or designations would be made which allow entry when unavoidable). Major vegetation changes in or adjacent to potential ACECs may lead to damage or loss of cultural and/or natural values. See Appendix K for specific impacts.

Analysis of the sample 5-year timber sale plan indicates that three sales would involve lands within potential ACECs. The potential Table Rock ACEC has two units within its buffer zone. One unit lies within the buffer zone of the potential Soosap Meadows ACEC. Appropriate measures would be taken to prevent direct damage to critical resources in these potential ACECs.

Table 3-16 Probable Changes in Potential ACECs
During Next Five Decades[1]

Potential ACECs	Existing Condition	Relative Changes by Alternative PA,5,6	1	2	3	4	7
Columbia River Gorge	Good	0	--	0	0	0	0
Sandy River Gorge	Good	0	--	0	0	0	0
Williams Lake	Fair	0	--	-	0	0	--
Soosap Meadows	Good	0	--	-	0	0	-
Table Rock	Good	0	--	-	0	0	-
Carolyn's Crown	Good	0	--	0	0	0	-
Middle Santiam Terrace	Fair	0	--	0	0	0	0

+ = Beneficial   - = Adverse   0 = None or Negligible

[1] Criteria used to determine change ratings are presented in Appendix K.

IMPACTS OF HERBICIDES ON HUMAN HEALTH

The possibility of human health being impacted by the use of herbicides is related to the toxicity of the herbicide and the likelihood of exposure (Norris 1975). A substance of moderate or high toxicity may represent no significant hazard if exposure is very low, just as a relatively non-toxic agent may be harmful if exposure is extensive and long term. Herbicides proposed for use in the SYUs are Krenite and glyphosate (Roundup) which are slightly toxic; Atrazine and Triclopyr (Garlon 3A) which have a low order of toxicity; Picloram (Tordon) which is practically non-toxic and 2, 4-D which is moderately toxic (Weed Science Society of America 1979). Treated acres would range from 13,400 under Alternative 1 to 6,750 under Alternative 4. No acres would be treated under Alternative 6.

In general, exposure of humans to herbicides can occur in two ways: directly, as in the case of applicators, or indirectly. The number of persons that could be directly affected by herbicide application in the SYUs is very small. Indirect exposure from contact with recently sprayed vegetation or contaminated streams is more likely to occur than is direct contact. Planned delivery techniques would reduce or prevent spray from drifting onto streams and water bodies. Areas to be sprayed would be posted. Contact with newly sprayed vegetation could occur should someone traverse a sprayed area. However, contact with newly sprayed vegetation would be discouraged by posting of affected areas. After the application dries, the chemical is absorbed into the foliage or adsorbed onto the surfaces of soil and litter particles, becoming unavailable on contact to individuals traversing an area. Because of the limited toxicity of the herbicides and the low potential for exposure, the likelihood of an adverse impact on human health is negligible.

All herbicides proposed for use in the SYUs are registered with the Environmental Protection Agency. Some pesticides currently available and in use by BLM were at one time supported for registration by laboratory tests conducted by Industrial Biotest Labs (IBT). Various tests done by IBT were found to be invalid 5 to 6 years ago (U.S. EPA 1977). At that time, EPA initiated investigations to determine if the invalidity of these tests created data gaps so critical that use of any pesticide supported in registration by IBT tests created an immediate hazard to humans and/or the environment. Whether the invalidity of these tests have created such an imminent risk has not been determined.

The toxicological data supporting the registration of Roundup and Krenite are for the most part proprietary. These data have been provided to EPA for analysis and judgment but are not available to any other party. BLM relies on the judgment of EPA, as reflected on the product label, that these herbicides are safe for forestry use.

Atrazine is readily adsorbed on muck and clay soils, which restricts leaching. Under cold soil conditions, Atrazine will persist more than a year. Triclopyr (Garlon 3A) leaches out of the soil quickly and is very rapidly degraded by microbes.

A wide variety of mutagenesis assays (see Glossary) have been conducted on 2, 4-D. A few have shown evidence of positive effects at high concentrations. Evidently, 2, 4-D is a very weak mutagen (see Glossary), but there is no evidence that suggests 2, 4-D represents an environmental hazard. (These data are summarized in an affidavit by F.N. Dost on file in the U.S. Attorney's Office in Portland, Oregon). The mutagenicity tests, which are used as an indicator of potential carcinogenic activity, do not suggest that 2, 4-D is carcinogenic (see Glossary) (USDI, BLM 1981c).

Although studies of carcinogenicity of 2, 4-D conducted thus far do not indicate a carcinogenic hazard (Innes et al. 1969; Hansen et al. 1971), new studies are being conducted at the request of EPA. Considerable dispute has arisen because of allegations by a pathologist that the National Cancer Institute studies were incorrectly interpreted, and that his own evaluation showed a significant evidence of tumors. The Armed Forces Institute of Pathology was asked to provide a third assessment, which was negative (USDI, BLM 1981c).

2, 4-D, like other polychlorinated phenols, when burned, can form a dioxin. The dioxin produced from heating, if one should form, would be 2, 7 - dichlorodibenzo-p-dioxin, reported to be minimally toxic (Epstein 1970; Schulze et al. 1973, Cited in Shearer and Halter 1980).

2, 7 - dichlorodibenzo-p-dioxin (DCDD) has been identified in 2, 4-D by Canadian researchers. EPA analyses of 30 U.S. formulations showed that three samples contained less than 60 parts per billion (ppb) DCDD, and the remainder contained no detectable DCDD or other chlorodioxins. This specific chlorodioxin has less general toxicity than 2, 4-D. It was assessed for carcinogenicity by the National Cancer Institute (NCI) in 1973 by feeding 5,000 and 10,000 ppm (0.5 and 1.0 percent of the total diet) to male and female rats and mice for a lifetime. Male mice showed a "suggestion" of carcinogenicity. Neither female mice nor both groups of rats were affected (NCI 1979, Cited in USDI, BLM 1981c).

2, 4-dichlorophenol, as an intermediate in the microbial and fungal degradation of 2, 4-D, is broken down by the same organisms in soil, litter and water that form it from 2, 4-D. Its degradation to other products is rapid, and its accessibility to higher organisms is exceedingly limited (USDI, BLM 1981c).

EPA recently reviewed all the available research about potential health effects of 2, 4-D. Based on this review, the EPA concluded that the continued use of 2, 4-D does not pose an imminent hazard or unreasonable adverse effect when used according to label precautions and directions for use (U.S. EPA 1980). EPA has asked manufacturers to conduct more tests to bring the knowledge about 2, 4-D up to standards currently required for the registration of new chemicals.

Public concern over the continuing use of herbicides in forestry resulted in a joint position statement issued in April 1981 by the U.S. Forest Service, Environmental Protection Agency and the U.S. Bureau of Land Management. This statement concluded that, "An assessment of current data on these chemicals

(Asulam, Dicamba, Krenite MSMA, Picloram, Atrazine, 2, 4-D and Simazine) coupled with the anticipated exposure indicates no reason to believe that they are posing an unreasonable risk to human health or the environment when used in accordance with the label requirements."

IMPACTS ON ENERGY USE

Table 3-17 indicates the energy investment required, by alternative, as expressed in British thermal units (Btu's - see Glossary). All energy consumed would be in the form of fossil fuels or derivatives, and any energy investment would constitute an irretrievable reduction of world supplies of petroleum-derived energy. Table 3-17 further illustrates that the majority of energy consumed is attributable to log production (all actions taken to harvest trees and get logs to the mill) and road development and maintenance.

The annual energy consumption ranges from .331 trillion Btu's (Alternative 4) to .582 trillion Btu's (Alternative 1). If the .456 trillion Btu's attributable to the proposed action were all expended in the form of gasoline, it would equate to 3.7 million gallons, or about 0.3 percent of the 1.29 billion gallons of gasoline consumed in Oregon in 1980. This energy investment is about 0.1 percent of the projected 1980 Oregon total of 581 trillion Btu's (Oregon Department of Energy 1980).

IMPACTS ON SOCIOECONOMIC CONDITIONS

Socioeconomic impacts are displayed in terms of two different base conditions. First, impacts are measured from an "existing condition" baseline representing recent experience (excepting the current timber market depression) in terms of economic activity generated by lands in the SYUs. (See Figure 2-5 for graph of BLM harvest volumes over the past decade.) The purpose of this comparison is to place the potential effects of the alternative programs in the context of recent economic conditions so that affected publics can understand how future economic conditions would differ from current conditions. Secondly, impacts are measured from the "no action" baseline representing anticipated average conditions over the next decade if the current management program were continued. This comparison is designed to show the program manager how future conditions would be affected by program changes.

Short-Term Economic Impacts

Tables 3-18 and 3-19 show projections representing average local employment and earnings dependent on timber sales under the proposed action and the alternatives during the first decade after implementation. Impacts on employment and earnings would be phased in over a period of 2 or 3 years due to the customary time lag between sale and harvest. Impacts on receipts would be delayed an additional year.

While labor productivity is expected to increase in future years leading to fewer jobs per unit of production (Wall and Oswald 1979), the impact estimates have not been adjusted to reflect productivity changes in order to make them simpler and more readily understood. The effect of this simplification is to overstate the impacts on employment and earnings by about 10 percent in the short term and possibly by greater amounts in the long term.

Table 3-17 Estimated Annual Energy Consumption Attributable to the Proposed Action and Alternatives

Proposed Action

Treatment	Units	Estimated Cost per Unit[1/] ($)	Assumed Energy Requirement per $ of Cost (1,000 Btu's)	Energy Consumption (1,000,000 Btu's)
Roads				
New Construction	9.6 miles	50,000	80	38,400
Reconstruction	5.0 miles	15,000	60	4,500
Log Production (all actions taken to cut trees and get logs to the mill)	90.9 MM bd. ft.	75	55	374,963
Site Preparation				
Broadcast Burning	1,134 acres	250	31	8,789
Herbicide [2/]	505 acres	50	122	3,080
Mechanical	358 acres	150	30	1,611
Plantation Maintenance and Release [2/]	500 acres	50	122	3,050
Planting	1,944 acres	105	31	6,328
Precommercial Thinning	1,116 acres	100	31	3,460
Fertilization [3/]	798 acres	100	122	9,736
Plantation Protection	436 acres	125	31	1,690
Total				455,607

Energy Requirements for the Proposed Action and Alternatives

	Proposed Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6[4/]	Alt. 7
Total Energy Consumption (Trillion Btu's)	.456	.582	.466	.460	.331	.492	.428	.452

[1/] BLM estimated costs per unit were often a range of values. The listed costs were selected as indicative of the SYUs for 1980. Similarly, DOE energy requirements were also given as a range in some cases.

[2/] Diesel carrier (when used) has been considered in determining costs and energy requirements for herbicide application.

[3/] Costs and energy requirements for fertilization account for the conversion of petroleum-based raw materials for manufacture and energy requirements for delivery and application.

[4/] Manual methods for plantation release have been considered during the computation of energy use for Alternative 6.

Source: BLM data except for assumed energy requirements per dollar of cost, which were derived by Department of Energy, Region X Staff.

Table 3-18 Short-Term Impacts Compared to Existing Condition on Local Employment and Earnings Related to Timber Harvest
(Average annual amounts during first decade, earnings in thousands of 1979 dollars)

	Existing Condition 1/	Change From Existing Condition							
		Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	Alt. 7 2/ No Action
CLACKAMAS COUNTY									
Timber industry employment	249	+32	+119	+38	+35	-72	+58	+18	+17
Logging & processing 3/	245	+32	+118	+38	+35	-71	+57	+17	+17
Forest management 4/	4	0	+1	0	0	-1	+1	+1	0
Total employment 5/	981	+127	+467	+151	+139	-285	+227	+71	+67
Total earnings	$12,991	+$1,681	+$6,184	+$1,999	+$1,840	-$3,775	+$3,005	+$939	+$886
LINN COUNTY									
Timber industry employment	378	+50	+181	+59	+55	-110	+87	+27	+26
Logging & processing 3/	373	+49	+179	+58	+54	-109	+86	+26	+26
Forest management 4/	5	+1	+2	+1	+1	-1	+1	+1	0
Total employment 5/	821	+109	+393	+129	+119	-238	+189	+58	+56
Total earnings	$11,467	+$1,519	+$5,489	+$1,800	+$1,659	-$3,326	+$2,644	+$815	+$785
MARION COUNTY									
Timber industry employment	78	+10	+37	+12	+11	-23	+18	+5	+5
Logging & processing 3/	76	+10	+36	+12	+11	-22	+18	+5	+5
Forest management 4/	2	0	+1	0	0	-1	0	0	0
Total employment 5/	282	+36	+135	+43	+40	-84	+63	+19	+19
Total earnings	$3,353	+$430	+$1,610	+$511	+$470	-$995	+$755	+$227	+$227
MULTNOMAH COUNTY									
Timber industry employment	114	+15	+55	+18	+16	-33	+26	+8	+8
Logging & processing 3/	114	+15	+55	+18	+16	-33	+26	+8	+8
Forest management 4/	0	0	0	0	0	0	0	0	0
Total employment 5/	345	+45	+165	+54	+50	-100	+80	+24	+24
Total earnings	$4,914	+$646	+$2,357	+$768	+$707	-$1,431	+$1,135	+$341	+$341
EIS AREA									
Timber industry employment	819	+107	+392	+127	+117	-238	+189	+58	+56
Logging & processing 3/	808	+106	+388	+126	+116	-235	+187	+56	+56
Forest management 4/	11	+1	+4	+1	+1	-3	+2	+2	0
Total employment 5/	2,429	+317	+1,160	+377	+348	-707	+559	+172	+166
Total earnings	$32,725	+$4,276	+$15,640	+$5,078	+$4,676	-$9,527	+$7,539	+$2,322	+$2,239

1/ Existing condition is based on 1976-78 average harvest of 80.4 million board feet per year. These estimates differ from those in Table 2-16 because of the inclusion of forest management employment.

2/ No action condition in this table shows the change from the existing situation which would occur if the existing program were continued.

3/ Logging and processing includes all timber industry employment as presented in Table 2-16. Estimated here by ratio of timber industry employment generated in county to total harvest from BLM-administered lands in the EIS area as derived from Table 2-16.

4/ Forest management employment represents the employment of workers normally classified in other industries but included in the timber manufacturing industry here for convenience because of their small values. See Appendix M for their calculation.

5/ For the various alternatives, total employment includes the changes in employment in all industries resulting from the change in timber industry employment (also included).

Table 3-19 Short-Term Impacts Compared to No Action Condition on Local Employment and Earnings Related to Timber Harvest
(Average annual amounts during first decade, earnings in thousands of 1979 dollars)

Item	Projected County Total (1985)1/	Change From No Action Condition							No Action Condition
		Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	(Alt. 7)2/
CLACKAMAS COUNTY									
Timber industry employment	4,725	+15	+102	+21	+18	-89	+41	+1	266
Logging & processing3/	NA	+15	+101	+21	+18	-88	+40	0	262
Forest management4/	NA	0	+1	0	0	-1	+1	+1	4
Total employment5/	79,600	+60	+400	+84	+72	-352	+160	+4	1,048
Total earnings	$1,054,000	+$795	+$5,297	+$1,113	+$954	-$4,661	+$2,118	+$52	$13,877
LINN COUNTY									
Timber industry employment	6,675	+24	+155	+33	+29	-136	+61	+1	404
Logging & processing3/	NA	+23	+153	+32	+28	-135	+60	0	399
Forest management4/	NA	+1	+2	+1	+1	-1	+1	+1	5
Total employment5/	43,150	+53	+337	+73	+63	-294	+133	+2	877
Total earnings	$603,000	+$734	+$4,704	+$1,015	+$875	-$4,111	+$1,859	+$30	$12,252
MARION COUNTY									
Timber industry employment	3,100	+5	+32	+7	+6	-28	+12	0	83
Logging & processing3/	NA	+5	+31	+7	+6	-27	+12	0	81
Forest management4/	NA	0	+1	0	0	-1	0	0	2
Total employment5/	111,000	+17	+116	+24	+21	-103	+44	0	301
Total earnings	$1,320,000	+$203	+$1,384	+$284	+$244	-$1,221	+$528	0	$3,580
MULTNOMAH COUNTY									
Timber industry employment	5,775	+7	+47	+10	+9	-41	+18	0	122
Logging & processing3/	NA	+7	+47	+10	+9	-41	+18	0	122
Forest management4/	NA	0	0	0	0	0	0	0	0
Total employment5/	412,500	+21	+141	+30	+26	-124	+56	0	369
Total earnings	$5,879,000	+$305	+$2,016	+$428	+$367	-$1,772	+$794	0	$5,254
EIS AREA									
Timber industry employment	20,275	+51	+336	+71	+62	-294	+132	+2	875
Logging & processing3/	NA	+50	+332	+70	+61	-291	+130	0	864
Forest management4/	NA	+1	+4	+1	+1	-3	+2	+2	11
Total employment5/	646,250	+151	+994	+211	+182	-873	+393	+6	2,595
Total earnings	$8,856,000	+$2,037	+$13,401	+$2,840	+$2,440	-$11,765	+$5,299	+$82	$34,963

NA - Not available.

1/ Employment projections from U.S. Department of Energy, Bonneville Power Administration 1979.

2/ No action condition reflects the amount of employment and income expected to be generated under the existing program.

3/ Logging and processing includes all timber industry employment as presented in Table 2-16. Estimated here by ratio of timber industry employment generated in county to total harvest from BLM-administered lands in the EIS area as derived from Table 2-16.

4/ Forest management employment represents the employment of workers normally classified in other industries but included in the timber manufacturing industry here for convenience because of their small values. See Appendix M for their calculation.

5/ For the various alternatives, total employment includes the changes in employment in all industries resulting from the change in timber industry employment (also included).

As shown in Table 3-18, continuation of the current management program (Alternative 7) would increase local employment in timber harvesting and processing by 56 workers on the average during the next decade over the number employed under the existing condition. (Data for the existing condition are shown in the first column of the table.) Employment in forest management activities not normally performed in conjunction with logging would remain at the same level as in the existing condition. The equivalent of 11 full-time workers would be employed on a number of seasonal and intermittent activities such as tree planting and brush control. About 166 more workers in all would be employed, and $2,239,000 more would be earned annually than in the existing condition. Compared to the existing condition, the proposed action and all alternatives except 4 would have positive impacts. Alternative 4 would cause the loss of 238 timber industry jobs and 707 jobs in the economy as a whole, and would reduce income by $9,527,000 in the EIS area. Under Alternative 4, reductions in total covered employment for individual counties would amount to: Clackamas, -0.5 percent; Linn, -0.8 percent; Marion, -0.1 percent; and Multnomah, -0.03 percent.

Local communities dependent on BLM timber supplies (see Chapter 2, Socioeconomic Conditions) would probably experience similar impacts, but information is not available to quantify them. Alternative 1 would have the greatest positive economic impacts.

As shown in Table 3-19, the total employment generated in the four-county area by a continuation of the current management program (no action condition) would average 2,595 jobs, and income generated as measured by worker earnings would amount to $34,963,000 in 1979 dollars.

As compared with a continuation of current management, the proposed action would sustain about 51 more jobs in the timber industry and 151 more jobs in the local economy as a whole (including the lumber industry). Local income would be increased by $2,037,000 annually. As shown in Table 3-19, employment and earnings would be slightly more in each of the counties. Impacts on employment and earnings for the other alternatives are also shown in Table 3-19. Adverse impacts would result only from Alternative 4, which would reduce total employment by 873 jobs and total earnings by $11,765,000.

Tables 3-20 and 3-21 show impacts on income and employment related to fishing, hunting and other recreation. Compared to the existing condition (Table 3-20), the only negative impacts related to these activities would occur in fishing-related income and employment for all alternatives except Alternative 4. Compared to the no action condition (Table 3-21), impacts related to these activities are positive except for some negative impacts under Alternatives 1 and 2.

The net short-term impacts on income (earnings) and employment related to timber production, fishing, hunting and other recreation are summarized for each alternative in Table 3-22.

Table 3-20 Short-Term Impacts Compared to Existing Condition on Local Income and Employment Related to Fishing, Hunting and Other Recreation (Income in thousands of 1979 dollars)

Alternative	Fishing 1/ Income	Fishing 1/ Employment	Hunting Income	Hunting Employment	Other Recreation Income	Other Recreation Employment
Proposed Action	- 5.0	- 1	+ 1.0	0	+ 24.9	+ 3
1. Max. Tbr.	-86.6	- 8	- 1.0	0	-195.9	-24
2. Emp. Tbr.	-40.6	- 3	- 0.5	0	- 96.2	-12
3. Mod. Tbr.	- 7.9	- 1	+ 0.5	0	- 24.9	- 3
4. Emp. Other	+31.2	+ 2	+ 2.6	0	+ 57.0	+ 7
5. Acc. Tbr.	- 5.0	- 1	+ 1.0	0	+ 24.9	+ 3
6. No Herb.	- 5.0	- 1	+ 1.0	0	+ 24.9	+ 3
7. No Action	- 9.6	- 1	- 1.1	0	-124.7	-15
Existing Condition 2/	275.4	25	60.4	7	1,214.6	148

1/ Includes income and employment generated in other parts of Oregon and in Washington.

2/ Existing condition as described in Chapter 2. Impacts shown in this table represent amount of change measured from existing condition.

Table 3-21 Short-Term Impacts Compared to No Action Condition on Local Income and Employment Related to Fishing, Hunting and Other Recreation (Income in thousands of 1979 dollars)

Alternative	Fishing 1/ Income	Fishing 1/ Employment	Hunting Income	Hunting Employment	Other Recreation Income	Other Recreation Employment
Proposed Action	+ 4.6	0	+ 2.1	0	+149.6	+18
1. Max. Tbr.	-77.0	- 7	0.0	0	- 71.2	- 9
2. Emp. Tbr.	-31.0	- 2	+ 0.5	0	+ 28.5	+ 3
3. Mod. Tbr.	+ 1.7	0	+ 1.5	0	+ 99.7	+12
4. Emp. Other	+40.8	+ 3	+ 3.6	0	+181.7	+22
5. Acc. Tbr.	+ 4.6	0	+ 2.1	0	+149.6	+18
6. No Herb.	+ 4.6	0	+ 2.1	0	+149.6	+18
7. No Action	2/	2/	2/	2/	2/	2/
Expected Amounts under No Action	265.8	24	59.3	7	1,090.0	133

1/ Includes income and employment generated in other parts of Oregon and in Washington.

2/ There are no impacts under the no action condition, since in this table it serves as the base from which the impacts are measured.

Table 3-22 Summary of Impacts on Income and Employment

Alternative	For Existing Condition Earnings	Employment	For No Action Condition Earnings	Employment
Proposed Action	+$ 4,297,000	+ 319	+$ 2,193,000	+ 169
1. Max. Tbr.	+ 15,357,000	+1,128	+ 13,253,000	+ 978
2. Emp. Tbr.	+ 4,941,000	+ 362	+ 2,838,000	+ 212
3. Mod. Tbr.	+ 4,644,000	+ 344	+ 2,543,000	+ 194
4. Emp. Other	- 9,436,000	- 698	- 11,539,000	- 848
5. Acc. Tbr.	+ 7,560,000	+ 561	+ 5,455,000	+ 411
6. No Herb.	+ 2,343,000	+ 174	+ 238,000	+ 24
7. No Action	+ 2,194,000	+ 150	0	0

Current and projected distributions of O&C revenues are shown in Table 3-23. The actual distribution from Eastside Salem lands in fiscal 1980 is shown in the first column of the table. The projected distributions represent the various harvest levels valued at the average timber sale price in the SYUs in fiscal 1980 ($271,130/MM bd. ft.).

Table 3-24 shows the impact as compared to the no action condition of differences in O&C payments on local government finances. The differences are shown as percentages of total property tax levies to indicate overall fiscal impacts. The table shows that impacts would be positive except under Alternative 4. Under that alternative, Curry County would experience a revenue reduction equivalent to 4.1 percent of total levies. Local governments in Curry County would have to increase property taxes or other revenues by a like amount or reduce expenditures. The other O&C counties would be similarly affected to a lesser degree. Impacts as compared to the existing situation (1976-78 average harvest level) would be similar in direction and size to those for the no action condition.

Payment to the State from revenues from public domain lands would be increased by minor amounts under all alternatives when compared to the present condition. Compared to the no action condition they would be less by about $19,000 annually under Alternative 4, but would be increased under the proposed action and all other alternatives.

Long-Term Economic Impacts

Long-term impacts related to timber production under each alternative would generally be very similar to short-term impacts. Impacts on local employment and earnings would be reduced over time if worker productivity continued to increase. Lower timber industry employment due to reduced private timber supplies would make the impacts larger in relation to the timber industry.

Economic activity related to fishing would increase slightly under the proposed action and by greater amounts under Alternative 4, but would be reduced under Alternatives 1 and 2.

Table 3-23 Distribution of O&C Payments from SYUs to Counties
(Thousands of dollars)

County	Actual Payments FY 1980	Existing Condition (1976-78)2/	Projected Payments Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Al. 6 No Herb.	Alt. 7 No Action
Benton	$ 169	$ 286	$ 324	$ 423	$ 331	$ 327	$ 203	$ 352	$ 306	$ 306
Clackamas	333	565	639	836	653	646	400	695	604	604
Columbia	124	210	237	310	242	240	149	258	224	224
Coos	354	600	679	888	694	687	426	739	642	642
Curry	219	371	420	580	429	425	263	457	397	397
Douglas	1,505	2,548	2,884	3,772	2,948	2,916	1,807	3,138	2,726	2,726
Jackson	941	1,594	1,804	2,359	1,844	1,824	1,130	1,963	1,705	1,705
Josephine	726	1,229	1,391	1,819	1,421	1,406	871	1,513	1,314	1,314
Klamath	141	238	269	352	275	272	169	293	255	255
Lane	917	1,553	1,758	2,299	1,797	1,777	1,101	1,913	1,662	1,662
Lincoln	22	37	41	54	42	42	26	45	39	39
Linn	159	269	304	397	311	307	190	331	287	287
Marion	88	149	168	220	172	170	105	183	159	159
Multnomah	65	111	126	164	128	127	79	137	119	119
Polk	130	220	249	325	254	251	156	271	235	235
Tillamook	34	57	64	84	66	65	40	70	61	61
Washington	38	64	73	95	74	73	45	79	69	69
Yamhill	43	73	83	108	85	84	52	90	78	78
Total	$6,007	$10,173	$11,514	$15,057	$11,767	$11,640	$7,212	$12,526	$10,881	$10,881

[1] Projected O&C payments were estimated as one-half the portion of total harvest derived from O&C lands, valued at the average sale price for Eastside Salem stumpage in FY 1980.

[2] Existing condition establishes a baseline for comparison represented by 1976-78 average harvest of 80.4 million board feet valued at the FY 1980 average sale price. The actual distribution from Eastside Salem harvest in FY 1980 is shown in the first column.

Table 3-24 Short-Term Impacts of O&C Payments on Local Government Finances
(Changes in O&C payments shown as percent of 1980-81 total property tax levies)

		Change from No Action Condition 1/							
County	1980-81 Total Levies ($1000)	Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	Alt. 7 No Action Condition 2/
Benton	$ 26,018	+0.1	+0.5	+0.1	+0.1	-0.4	+0.2	0	1.2
Clackamas	117,365	+0.0	+0.2	+0.0	+0.0	-0.2	+0.1	0	0.5
Columbia	17,218	+0.1	+0.5	+0.1	+0.1	-0.4	+0.2	0	1.3
Coos	22,794	+0.2	+1.1	+0.2	+0.2	-0.9	+0.4	0	2.8
Curry	3,261	+0.7	+4.7	+1.0	+0.8	-4.1	+1.8	0	12.2
Douglas	30,742	+0.5	+3.4	+0.7	+0.6	-3.0	+1.3	0	8.9
Jackson	46,413	+0.2	+1.4	+0.3	+0.3	-1.2	+0.6	0	3.7
Josephine	18,723	+0.4	+2.7	+0.6	+0.5	-2.4	+1.1	0	7.0
Klamath	19,457	+0.1	+0.5	+0.1	+0.1	-0.4	+0.2	0	1.3
Lane	128,887	+0.1	+0.5	+0.1	+0.1	-0.4	+0.2	0	1.3
Lincoln	21,438	+0.0	+0.1	+0.0	+0.0	-0.1	+0.0	0	0.2
Linn	36,465	+0.0	+0.3	+0.1	+0.1	-0.3	+0.1	0	0.8
Marion	81,858	+0.0	+0.1	+0.0	+0.0	-0.1	+0.0	0	0.2
Multnomah	289,074	+0.0	+0.0	+0.0	+0.0	-0.0	+0.0	0	0.0
Polk	17,345	+0.1	+0.5	+0.1	+0.1	-0.5	+0.2	0	1.4
Tillamook	6,264	+0.1	+0.4	+0.1	+0.1	-0.3	+0.1	0	1.0
Washington	124,592	+0.0	+0.0	+0.0	+0.0	-0.0	+0.0	0	0.1
Yamhill	23,271	+0.0	+0.1	+0.0	+0.0	-0.1	+0.1	0	0.3
Total	$1,031,185	+0.1	+0.4	+0.1	+0.1	-0.4	+0.2	0	1.1

1/ Derived from Table 3-23. For example, the impact shown for Benton County under the proposed action represents payments to Benton County under the proposed action less those under the no action alternative as a percent of total levies (($324,000-306,000) ÷ $26,018,000/100= 0.1%).

2/ The no action condition represents the distribution of O&C revenues from the SYUs (Table 3-23).

Cumulative Economic Impacts

Cumulative impacts resulting from the alternatives for the Eastside Salem SYUs in combination with the adoption of new timber management plans announced for the Josephine, Jackson and Klamath Sustained Yield Units of BLM's Medford District have been examined compared only to the No Action alternative. These impacts would be additive, that is, they would be the sum of the impacts of the individual actions.

The Medford District's new plans will reduce total O&C revenue and distribution by about 4.0 percent in the short term. This amounts to about $13 million when considered in terms of current timber sale values. The cumulative impact under the proposed action would amount to 3.6 percent less revenue, or around $12 million. This difference would be equivalent to an average of 22 cents per $1,000 of assessed value and 0.5 percent of total levies for all O&C counties. The most severe cumulative impact would be a 6.3 percent decrease in O&C revenue if Alternative 4 were adopted. The cumulative impact of Alternative 1 together with the planned changes in Medford District would be a decrease of 1.3 percent in O&C revenue.

Other Social Impacts

Employment impacts under Alternative 4 would cause the loss of jobs as soon as the current backlog of timber sold, but not cut, is used up. If timber job losses were associated with a mill closure, workers in the core work force would be unemployed. Older workers might not be able to obtain new jobs. The personal losses would be great for these individuals deprived of their functional relationship to society.

The use of herbicides would continue to be controversial due to concerns of some residents about ecosystem damage or health damage as opposed to the concerns of other residents for economic benefits in timber production.

Underlying conflict between people with personal economic concerns (such as the timber industry) and those with other personal concerns may be increased. The impacts of specific treatments (such as herbicide application) on personal and community concerns would depend in part on the locations of treatment application and the manner in which BLM communicates and negotiates its actions with affected residents.

Residents of timber-dependent localities may be affected by their perception of the degree of control they exercise over local affairs. Some local residents are likely to feel that their concerns have not been adequately addressed and that they have reduced control over local affairs. According to a survey cited in Chapter 2, more residents of metropolitan Portland and the Willamette Valley favor increased wildlife habitat, more wilderness, and more hiking, camping, hunting and fishing opportunities than favor increased timber production. The net impacts of the alternatives in terms of these concerns are indeterminable, since they would depend on the intensity of the concern, the knowledge of the holder, and the specific alternatives being compared.

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT WERE SENT

LIST OF PREPARERS

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

Comments on the draft environmental statement were requested from the following:

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
    Forest Service
    Pacific Northwest Forest and Range Experiment Station
    Soil Conservation Service
Department of Commerce
    National Marine Fisheries Service
Department of Defense
    U.S. Army Corps of Engineers
Department of Energy
    Region X
Department of the Interior
    Fish and Wildlife Service
    Geological Survey
    National Park Service
    Bureau of Mines
    Bureau of Reclamation
Small Business Administration
Environmental Protection Agency

State and Local Government

Oregon State Clearinghouse
Oregon Regional Clearinghouses
    Metropolitan Service District
    Mid-Willamette Valley Council of Governments
    District 4 Council of Governments
Oregon State Historic Preservation Officer
Boards of County Commissioners
    Clackamas County
    Marion County
    Multnomah County
    Linn County

Interest Groups (partial listing)

American Forest Institute
Associated Oregon Industries
Associated Oregon Loggers, Inc.
Association of O&C Counties
Cascade Holistic Economic Consultants
Defenders of Wildlife
Friends of the Earth
Industrial Forestry Association
Izaak Walton League
Native Plant Society of Oregon
Natural Resource Defense Council
National Wildlife Federation
Northwest Environmental Defense Center
Northwest Timber Association
Oregon Environmental Council
Oregon Natural Heritage Program
Oregon Student Public Interest Research Group
Oregon Wilderness Coalition
Sierra Club
The Wilderness Society
Western Forest Industries Association
Wildlife Management Institute

Copies of this draft environmental impact statement will be available for public inspection at the following BLM offices:

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Informal discussion sessions intended to assist in reviewing and commenting on the DEIS will be held at 1:00 p.m. and 7:00 p.m., March 2, 1982, at the Bureau of Land Management Salem District Office, 1717 Fabry Road S.E., in Salem, Oregon. Bureau of Land Management personnel will be available at both sessions to answer questions regarding the adequacy of the DEIS analysis.

LIST OF PREPARERS

While individuals have primary responsibility for preparing sections of an EIS, the document is an interdisciplinary team effort. In addition, internal review of the document occurs throughout preparation. Specialists at the District, State Office and Washington Office levels of the Bureau review the analysis and supply information. Contributions by individual preparers may be subject to revision by other BLM specialists and by management during the internal review process.

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Ray Mobley	Visual Resources	Landscape Architecture	4 years BLM (Landscape Architect, Visual Resources Specialist)
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William E. Power	Soils	Soil Science	12 years SCS (Soil Scientist) 12 years BLM (Soil Scientist)
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APPENDICES

APPENDICES

A O&C Legal Opinion and Policy Statement

B Development of the Proposed Action

C The Scoping Process

D Ecosystem Management

E Wildlife Species & Habitat Use

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J Primary Criteria Used to Determine Level of Timber Management Impacts on Major Recreation Activities

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M Estimation of Employment in Forest Management

APPENDIX A

O & C LEGAL OPINION AND POLICY STATEMENT

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SOLICITOR
WASHINGTON, D.C. 20240

SEP 0 8 1981

Memorandum

To: Director, Bureau of Land Management

From: Solicitor Jean Kingrey for Solicitor

Subject: Review of BLM Policy Statement for Multiple Use Management of the Oregon and California Railroad and Coos Bay Wagon Road Revested Lands (O&C Lands)

This responds to your May 14, 1981, memorandum requesting our opinion on the legal adequacy of the Bureau's proposed multiple use management policy for the O&C lands in western Oregon. The proposed multiple use policy encompasses six management objectives which are: timber production, water quality, wetlands, threatened and endangered species, habitat diversity, and recreational areas. Based on our review of the Act of August 28, 1937 (O&C Act), 50 Stat. 874, 43 U.S.C. 1181a et seq., its legislative history and subsequent legislation, we have concluded that the O&C Act places forest production in the dominant role within the entire scheme of the Bureau's management of the O&C lands. Further, the Act clearly does not mandate exclusive use, but instead requires management for other interests as well as timber supply. Therefore, the Bureau must see that its operations meld the dominant use of forest production with those aspects of multiple use envisioned by the O&C Act in addition to any relevant requirements specified in subsequent legislation. Thus, to the extent the Bureau's proposed policy, or portions thereof, fulfills this function, then it meets the test for legal sufficiency.

This memorandum will serve an additional function. In response to prior requests by the Bureau and the Department, the Solicitor's Office has examined various aspects of the management of the O&C lands.[1/] This paper will undertake to enunciate a clear interpretation of management authorized under the O&C Act. This opinion confirms the conclusion reached in the August 27, 1979, memorandum to the Director, BLM, from the Associate Solicitor, Energy and Resources, approved by the Solicitor, on "Technical Revisions of Earlier Opinions Concerning Bureau Management of O&C Lands." The August 27 memorandum recognizes that commercial forestry is only one of the components for which the timber on the O&C lands is to be managed. " . . . [P]ermanent forest production is to be maintained for various purposes which include, inter alia, recreation. Accordingly, there is no basis to conclude that recreation is always subordinate to the other purposes mentioned in the O&C Act as a matter of law."

[1/] a. Memorandum to the Director, BLM, from the Deputy Solicitor on "Applicability of Section 603 of the Federal Land Policy and Management Act of 1976 to the O&C and Coos Bay Wagon Road Lands," June 1, 1977.

b. Memorandum to the Secretary from the Solicitor on "BLM Wilderness Review--Sec. 603, Federal Land Policy and Management Act." September 5, 1978. M36910. 86 I.D. 91, 97-99.

c. Memorandum to the Director, BLM, from the Associate Solicitor, Energy and Resources, on "Legality of Deviating from Even Flow Policy in the Josephine Sustained Yield Unit," January 24, 1979.

d. Memorandum to the Director, BLM, from the Associate Solicitor, Energy and Resources, on "Technical Revisions of Earlier Opinions Concerning Bureau Management of O&C Lands," August 27, 1979.

e. Memorandum to the Director, BLM, from the Assistant Solicitor, Realty, on "Exchange of Oregon and California and Coos Bay Wagon Road Grant Lands under FLPMA," October 9, 1980.

DISCUSSION

Section 1 of the O&C Act requires the Department of the Interior to manage the O&C lands for "permanent forest production." As the chief component of forest production, the timber is to be sold, cut and removed in conformity with the principles of sustained yield so as not only to provide a permanent source of timber supply, but also to protect watershed, to regulate stream flow, to contribute to the economic stability of local communities and industries and to provide recreation. The relevant portions of Section 1 of the O&C Act are:

> . . . such portions of the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands as are or may hereafter come under the jurisdiction of the Department of the Interior, which have heretofore or may hereafter be classified as timberlands, and power-site lands valuable for timber, shall be managed, . . . for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal [sic] of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilties [sic]. . . . (43 U.S.C. § 1181a).

It is clear not only from the language of the Act itself, but also from the legislative history that the O&C legislation is a conservation measure requiring a form of multiple use management. The Department of the Interior drafted H.R. 7618, the bill which ultimately became the O&C Act. When transmitting the draft legislation, Acting Interior Secretary Charles West noted that the laws under which the O&C lands were being administered[2/] aimed at rapidly selling the timber and disposing of the lands for agricultural purposes. He went on to say:

[2/] Acts of June 9, 1916 (39 Stat. 218) and February 26, 1919 (40 Stat. 1179), as amended.

> My purpose in submitting these amendments is to stop this waste and destruction, by providing necessary authority for the sale of the timber and *the use of the land, in conformity with generally recognized principles of conservation*. Proper protection of the interest of the communities, the State and the Government requires a long-range program of planning, having for its object a well-regulated system of cutting, based upon the kind, character, and suitability of the timber, rather than upon the actual presence on a given subdivision of a fixed amount of merchantable timber. *The amendments will make possible also the reservation of cut-over land, timbered tracts, or an acreage of seed trees, when deemed necessary, as a conservation measure, in aid of reforestation, stream-flow protection, recreational use, or other public purposes.* [Emphasis added.] Senate Report No. 1231, 75th Cong., 1st Sess., 3-4 (August 16, 1937).

The House and Senate Reports accompanying H.R. 7618 reiterated the points made by Acting Secretary West. In the explanatory statement for Title I the Report of the Senate Committee on Public Lands and Surveys said:

> The purpose of title I, which comprises the first five sections, is to provide conservation and scientific management beyond liquidation of timber assets and protection from fire. . . . All land classified as timber in character will continue in Federal ownership and be managed for permanent forest production on what is commonly known as a sustained-yield basis. Under such a plan the amount of timber which may be cut is limited to a volume not exceeding new growth, thereby avoiding depletion of the forest capital. This type of management will make for a more permanent type of community, contributing to the economic stability of local dependent industries, protect watersheds, and aid in regulating streamflow. Senate Report No. 1231, 75th Cong., 1st Sess., 2 (August 16, 1937).[3]

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[3] *See also*, House Report No. 1119, 75th Cong., 1st Sess., 2 (June 28, 1937).

As envisioned by Acting Secretary West, H.R. 7618 gave the Department the authority to manage the timber in conformity with recognized principles of conservation and allowed it to reserve tracts of land when deemed necessary for the purposes of reforestation, stream-flow protection, recreational uses or other public purposes. The legislation as adopted provides this degree of flexibility in management. It gives the Department sufficient authority to administer the O&C lands for the dominant use of forest production in order to achieve those aspects of multiple use management referenced in the O&C Act.

Since passage of the O&C Act, numerous laws have been enacted which affect the Bureau's management authority of the public lands. The principal laws are cited in the Bureau's draft multiple use policy. Because most of these laws do not explicitly exempt management of the O&C lands from their coverage, they can require the BLM to take actions which may in fact conflict with the purposes of the O&C Act, e.g., Endangered Species Act Amendments of 1978, 16 U.S.C. 1531 et seq.; Clean Water Act of 1977, as amended, 33 U.S.C. 1251 et seq. However, this relationship is not applicable in the case of the Federal Land Policy & Management Act of 1976 (FLPMA), 43 U.S.C. 1701 et seq. FLPMA does not affect the Bureau's management of the O&C lands to the same degree as it affects the Bureau's general administration of the public lands.

FLPMA has been described as the organic act for the Bureau. Nevertheless, its effects over lands administered by the BLM are not universally felt, most especially in the case of the management of the O&C lands. Key provisions make it clear that the Bureau's authority under FLPMA may be limited by other provisions of law.

For example, in the Act's statement of policy Congress declared that:

> . . . goals and objectives be established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law. . . . [Emphasis added.] 43 U.S.C. § 1701(a)(7).

Section 301(a) defines the responsibilities of the Director, BLM:

> He shall carry out such functions and shall perform such duties as the Secretary may prescribe with respect to the management of lands and resources under his jurisdiction according to the applicable provisions of this Act and any other applicable law. [Emphasis added.] 43 U.S.C. § 1731(a).

Section 302(a) limits BLM's application of the principles of multiple use and sustained yield:

> The Secretary shall manage the public lands under principles of multiple use and sustained yield, in accordance with the land use plans developed by him . . . *except that where a tract of such public land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law.* [Emphasis added.] 43 U.S.C. § 1732(a).

And Section 701(b) defines the effect that the O&C Act has on management under FLPMA:

> Notwithstanding any provision of this Act, in the event of conflict with or inconsistency between this Act and the Acts of August 28, 1937 (50 Stat. 874; 43 U.S.C. 1181a-1181j), and May 24, 1939 (53 Stat. 753), insofar as they relate to management of timber resources, and disposition of revenues from lands and resources, the latter Acts shall prevail. 43 U.S.C. § 1701 note.

As the language quoted above makes clear, Congress deliberately made provision for a different manner of administering the O&C lands.

Because the O&C Act is a dominant use statute, the broad multiple use management approach provided for in FLPMA may conflict with the more restrictive management approach outlined in the 1937 Act. In FLPMA the concept of multiple use, as defined at Section 103(c), 43 U.S.C. § 1702(c), gives the BLM great flexibility in determining where, how, to what degree of intensity and for what objectives various natural resources are to be managed. By contrast, the O&C Act specifies that the O&C lands are to be managed for permanent forest production. Yet this resource is to be maintained for various purposes (i.e., permanent source of timber supply, watershed, stream flow, economic stability and recreational facilities). It falls to the BLM to determine the best way to achieve each of these goals.

The Bureau's proposed policy statement lists six resource objectives. The first involves timber production with the goal of maximizing production consistent with economic and environmental feasibility. The policy to achieve this goal would limit calculation of the allowable cut to lands which have the capacity to provide a sustained yield of timber. As was related above, the O&C Act is a conservation measure authorizing the Bureau to use scientific methods when managing the total resource. Furthermore, the Act itself specifies that the timber produced on the O&C lands is to be harvested in conformity with the principle of sustained yield.

The second objective is to maintain water quality at federal and state standards. Authority for achieving this goal may be found in the Clean Water Act of 1977, as amended, 33 U.S.C. 1251 et seq. Under the Clean Water Act, also known as the Federal Water Pollution Control Act (FWPCA), states may assume the responsibility for administering a pollutant discharge elimination permit system. 33 U.S.C. § 1342(b). Once a state's permit system is approved by the Environmental Protection Agency, then individuals operating federal programs must comply with the requirements of the state's permit program. See 33 U.S.C. §§ 1311 and 1362(5). Thus, to the extent that the BLM's policy for water quality meets Clean Water Act requirements, it also fulfills its O&C Act obligations.

The third objective is to protect wetlands including riparian zones in accordance with Executive Orders 11988 and 11990. In addition to the Executive Orders cited above, support for protection of wetlands on the O&C lands is found in the O&C Act itself and the Clean Water Act. As has been described above, the O&C Act is a conservation measure. The timber produced is to be managed in such a way as to protect watersheds and regulate stream flow. Protection of wetlands aids in achieving such goals. Even if specific protection of wetlands had not been envisioned at the time of the Act's passage, it is clear from the legislative history that Congress intended the O&C lands to be managed in accordance with scientific principles of conservation.[4] General sensitivity to the value of wetlands has developed relatively recently. In managing the O&C lands, the Bureau is obligated to incorporate the best conservation techniques for preservation of the resource. In addition, wetlands are included within the coverage of the Clean Water Act. In United States v. Weisman, 489 F. Supp. 1331, 1337-1338 (1980), the court said:

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[4] See the quotations above of Acting Interior Secretary Charles West and Senate Report No. 1231, 75th Cong., 1st Sess., 2 (August 16, 1937).

> Congress fully intended that the waters subject to regulatory control of the United States under the FWPCA be given the "broadest possible Constitutional interpretation." [citations deleted.] The scope is not limited to the traditional tests of navigability, but rather is defined in Section 502, FWPCA, 33 U.S.C. § 1362(7), which defines "navigable waters" under the FWPCA as "waters of the United States, including the territorial seas." [citations deleted] . . . . It is therefore clear that Congress intended to protect the waters of the United States in a plenary, geographic sense, and that wetlands are specifically included within that protection.

The fourth objective has two aims, the first of which is to maintain specifically identified habitat for species appearing on the federal threatened or endangered species list. Authorization to pursue this goal may be found in the Endangered Species Act Amendments of 1978 (Endangered Species Act), 16 U.S.C. 1531 et seq., which requires federal agencies to use their authorities in furtherance of the purposes of that Act for the conservation of federally listed endangered and threatened species and their critical habitat. 16 U.S.C. § 1536 (1978).[5] Because compliance with the Endangered Species Act can result in direct conflicts with the goals of the O&C Act, the Bureau's policy for achieving its federal endangered species objectives should focus on the particular needs of the listed species making every effort to overlap the goals of the two statutes whenever possible.

The Bureau's fourth O&C management objective also looks to provide special mitigating measures for state listed threatened and endangered species. The foundation underpinning this exercise of authority is found in the 1974 amendment to the Sikes Act, P.L. 86-797, 74 Stat. 1052, 16 U.S.C. 670a et seq. The Sikes Act Amendment, P.L. 93-452, 88 Stat. 1369, 16 U.S.C. 670g et seq., requires the Secretary of the Interior, in cooperation with states, to develop and maintain programs for the conservation and rehabilitation of wildlife, fish and game on the public lands. 6/ The principal method of implementing these wildlife conservation and rehabilitation programs is through cooperative agreements with the states. Any agreements thus entered into must provide, among other things, adequate protection not only for the fish and wildlife classified on the federal endangered species list but also those species "considered to be threatened, rare, or endangered by the State agency." 16 U.S.C. § 670h(c)(3)(D). Thus, to the extent the Bureau and the responsible state agency mutually determine the adequate amount of protection needed for federal and state listed species, then the Bureau's policy for the management of the O&C lands must reflect this additional responsibility.

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[5] The Endangered Species Act provides for an exemption mechanism. See 16 U.S.C. § 1536 (1978).

While the O&C lands come within the coverage of the Sikes Act Amendment, it is important to note that its drafters did not intend for fish and wildlife programs under the Act to "constitute a dominant use on public land areas to the exclusion of other appropriate uses." Senate Report No. 93-934, 93rd Cong., 2d Sess., 8 (June 14, 1974). Rather, one of the main purposes of the Sikes Act Amendment, as expressed by Congressman John D. Dingell during House floor debates on H.R. 11537, was to give the states an expanded role in the management of wildlife on the public lands. Congressman Dingell said:

> This is a comprehensive planning package in which the States will be ultimately involved. It is an attempt to finally resolve this ancient battle which has existed between the States and the Federal Government of game management on public lands. 120 Cong. Rec. 383 (January 22, 1974)

Because the O&C Act and the Sikes Act Amendment concern the same general subject matter, the management of resources on the public lands, statutory construction requires that effect should be given to both if possible. Rawls v. U.S., 331 F.2d 21 (1964);

6/ "Public lands" is defined in the Sikes Act Amendment as "all lands under the respective jurisdiction of the Secretary of the Interior. . . except land which is, or hereafter may be, within or designated as (A) a military reservation; (B) a unit of the National Park System; (C) an area within the national wildlife refuge system; (D) an Indian reservation; or (E) an area within an Indian reservation or land held in trust by the United States for an Indian or Indian tribe." 16 U.S.C. § 670k(4).

Anderson-Tully, Co. v. Murphree, 153 F.2d 874 (1946); In re Markel, 195 F.Supp. 926 (1961). In order to achieve the most complementary effect between these two laws, when developing cooperative agreements with the states, the Bureau must see how wildlife protection goals can best be achieved on lands not available for timber production. In the case of those areas of land where direct conflict in use will occur, the Bureau may choose one use over the other, provided it has analyzed its choice in the context of the principal goals of each Act and is satisfied that the particular choice has not significantly encroached upon the overall effect of those goals.

The fifth BLM proposed management objective for the O&C lands is to maintain habitat diversity. We believe to the extent that maintaining habitat diversity will promote the achievement of any targets specified in the O&C Act or other authorizing laws, for example, habitat management under the Sikes Act Amendment, 16 U.S.C. § 670k(6), or to the extent such practices would not be inconsistent with those targets, then the Bureau has authority to manage for such an objective. 7/

The last management objective is to protect potential and developed high-value recreational areas which includes the visual quality of signficant scenic areas identified through the Bureau's planning process. Because providing recreational facilities is one of the goals of the O&C Act, the BLM has the authority to manage for this purpose even if to do so were to come in conflict with managing for timber production. Additionally, we believe that the term "recreational facilties [sic]" appearing at 43 U.S.C. § 1181a is broad enough to include such things as scenic highways or scenic rivers which are identified as such through the Bureau's planning process.

7/ See Solicitor's Opinion M36910 on "BLM Wilderness Review--Sec. 603, Federal Land Policy and Management Act" which advances a similar position for the extent of wilderness review which is authorized on the O&C lands. "Congress has recognized . . . that some O&C lands might be unsuitable for timber production. Sec. 701(b) of FLPMA requires the wilderness review provisions of FLPMA to yield only to the extent they are inconsistent with the management of permanent forest production provided for in the O&C Act." 86 I.D. 91, 98.

CONCLUSION

Our review of the draft policy statement for management of the O&C lands indicates that only minor modifications are necessary to bring it into line with this legal analysis. As was stated earlier in this memorandum, the Bureau has the responsibility to see that its operations bring together the dominant use of forest production with those aspects of multiple use envisioned by the O&C Act in addition to any relevant requirements specified in subsequent legislation. We believe that the Bureau has struck this balance in much of its proposed policy.

In summary, while the O&C Act limits the Bureau's management options on the O&C lands, nevertheless, it provides the Bureau, to a certain degree, with a significant amount of discretion to determine how competing objectives will be met. Therefore, as the Bureau continues to develop its overall policy for managing the O&C lands, it will need to evaluate its options on a case-by-case basis in the context of the O&C Act as well as any other relevant legislation.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240

IN REPLY REFER TO:
5400(230)

MAY 14 1981

Memorandum

To: Solicitor

Through: Assistant Secretary, Land and Water Resources

JUN 3 1981

From: Director, Bureau of Land Management

Subject: Policy Statement - Multiple-Use Management of the Oregon and California Railroad Grant Lands (O&C)

The Bureau is currently updating the timber management program for the O&C lands in western Oregon. This involves classifying, inventorying, and allocating forest lands for multiple-use management. Plans are being developed for 13 Sustained Yield Units (SYU) and an environmental impact statement (EIS) prepared for each SYU. The EIS analyzes a range of land use allocations from maximum timber production to emphasis on wildlife habitat and other non-timber values.

The most recent EIS to be completed is the South Coast-Curry Timber Management Environmental Impact Statement. Comments received on this EIS have raised questions regarding the possible interpretations of the O&C Act of 1937 (50 Stat. 874; 43 U.S.C. 1181a, et seq.) in light of the numerous laws enacted during the 1970's which relate to the management of public resources, e.g., Clean Water Act, Endangered Species Act, Clean Air Act, NEPA, etc. In responding to these comments on the EIS, our Oregon State Director has indicated that the legal adequacy of our proposed multiple-use management will be addressed in the decision document for the South Coast-Curry Timber Management Plan.

Enclosed is a Policy Statement for the O&C lands that reflects the existing multiple-use policy direction of the Bureau in western Oregon. As indicated, this statement includes only policies that are involved with the multiple-use planning on the O&C lands and it is not a statement of all policies regarding these lands.

So we can keep our ongoing planning efforts on schedule, we would appreciate your prompt review and opinion of the legal adequacy of these policies.

Enclosure

Policy Statement

Major Multiple Use Considerations in the Management of the O&C Lands

I. Purpose:

The purpose of this statement is to clarify the Bureau's policy regarding the major land use allocations for multiple use management of the O&C lands in western Oregon. Policy direction is needed to structure land use decisions that are consistent with the Bureau's statutory mandates.

II. General Guidance:

A. Legislative and Executive Requirements

The primary statutory base for the management program on the O&C lands is the O&C Act of 1937 (50 Stat. 874; 43 U.S.C. 1181 a, et seq.). Under this act, lands classified as timberlands ". . . shall be managed for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal (sic) of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow and contributing to the economic stability of local communities and industries, and providing recreational facilities . . . ."

During the past several years, other legislation has been forthcoming and policy guidance has been issued which tend to broaden the relatively narrow management orientation provided by the O&C Act. A listing of these statutes and policy issuances most applicable to this discussion follows:

1. Legislative:

- O&C Act of 1937 (50 stat. 874; 43 U.S.C. 1181a, et seq.)
- Federal Land Policy and Management Act of 1976, 43 U.S.C. 1701 et seq.
- Coastal Zone Management Act, 16 U.S.C. 1451 et seq.
- Recreation and Public Purposes Act, 43 U.S.C. 809.
- National Environmental Policy Act of 1969, 42 U.S.C. 4321-4347.
- Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq.
- Act of July 1, 1944, 42 U.S.C. 300f (Safe Drinking Water).
- Endangered Species Act of 1973, 16 U.S.C. 1531 et seq.

- Act of September 15, 1960, 16 U.S.C. 670g (Sikes Act).

- Act of June 8, 1940, 16 U.S.C. 668, et seq. (Protection of Bald and Golden Eagles).

- Anadromous Fish Conservation Act, 16 U.S.C. 757 a et. seq.

- Fish and Wildlife Coordination Act, 16 U.S.X. 661=666c.

- Fishery Conservation and Management Act of 1976, 16 U.S.C. 1801-1802, 1811-1813, 1821-1825, 1851-1862, 1882.

- Migratory Bird Treaty Act of 1918, 16 U.S.C. 703-711.

- National Histories Preservation Act, 16 U.S.C. 470 et seq.

- Wild & Scenic Rivers Act, 16 U.S.C. 1271 et seq.

- Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa-47011.

2. Executive

- Executive Order 11514, Protection and Enhancement of Environmental Quality.

- Executive Order 11990, Protection of Wetlands.

- Executive Order 11988, Floodplain Management.

- Treaties with the Soviet Union, Japan, Mexico, and Canada relating to the protection of migratory birds and their environment.

B. Social/Economic Considerations:

Management of the O&C lands in western Oregon has a direct effect on the local and State economy. The revenues and employment generated by timber sales, conversion of timber to wood products, and the other values derived from 2.3 million acres of O&C lands provide a significant part of the local and State economy. Heavy public use associated with recreation and scenic values, and sports hunting and fishing sustains major economic values to the local economies. Anadromous fish production from cradle streams found on O&C lands supports a major commercial fishery that is of local and regional importance. Therefore, the primary thrust of the management program on the O&C lands is to provide a high-level and undiminishing output of wood under the principle of sustained yield and recognize and provide for these other needs so as to maintain the economic stability of the local communities and industries.

C. Land Classification:

All public land administered by the BLM in western Oregon is classified according to the Timber Production Capability Classification (TPCC). The TPCC is an intensive inventory process based on the land's physical and biological capacity to produce timber. Through this process forest lands are segregated into two categories: (1) Commercial Forest Lands which can be managed on a sustained yield basis (Suitable Lands), and (2) Commercial Forest Lands which cannot be managed on a sustained yield basis (Nonsuitable Lands).

D. Land Use Planning:

Land Use plans, (Management Framework Plans) as developed through the land use planning process, shall constitute the primary means for carrying out legislative mandates and Bureau policies. These plans shall set forth approved land uses along with the allocation of the resources thereon and serve as the framework for development and implementation of all resource plans, programs, and activities.

III. Multiple Use Policies:

A. Multiple Use Orientation

Lands classified as nonsuitable for timber production on a sustainable basis will be used to the fullest extent possible to meet nontimber needs. Where nonsuitable lands are inadequate to accommodate authorized nontimber needs, suitable lands will be substituted where a reduced level of timber production will serve with nontimber needs. Only when authorized nontimber needs cannot be met by a combination of the above will suitable lands be excluded from timber harvest.

B. Specific Resource Objectives and Policies

1. Timber Production:

a. Objective: Maximimize timber production through the highest level of management consistent with economic and environmental feasibility.

b. Policy:

1) The allowable cut shall be based on only those lands which have the capacity for providing a sustained yield of timber. Timber volume generated by experimental harvest on lands thought to be nonsuitable, if any, will be in addition to the allowable cut.

2) The allowable cut shall be based on a nondeclining harvest level over time. However, temporary increases over the nondeclining harvest level may be permitted as long as they do not exceed the long-term sustained yield capacity of the land. Temporary increases over the nondeclining harvest level will be permitted only if prescribed criteria are met. These criteria are: (1) early attainment of a regulated forest growing at its long-term sustained yield capacity; (2) reduction in mortality and accompanying timber volume loss; (3) minimizing any projected timber supply shortages; (4) minimizing the impacts of any future decrease in the current allowable cut; and (5) does not result in a subsequent future decrease below the nondeclining harvest level unless unusual and extenuating circumstances exist.

3) Silvicultural practices, including, but not limited to, site preparation, planting of genetically superior stock, brush control, precommercial thinning, fertilization, commercial thinning, and stand conversion, shall be carried out on forest lands suitable for intensive timber management, based on their technical, economical, and environmental feasibility.

2. Water Quality:

a. Objective: Maintain water quality at Federal and State standards.

b. Policy: Take mitigating measures to provide a high probability that water quality standards will be maintained. Limit or exclude timber harvesting only in areas where mitigating measures will not maintain water quality standards.

3. Wetlands: (Including riparian zones)

a. Objective: Protection of wetlands including riparian zones.

b. Policy: Take mitigating measures to protect wetlands. Limit or exclude timber harvesting only in areas where mitigating measures will not be effective.

4. Threatened or Endangered Species

a. Federal Listed Species

1) Objective: Maintain specifically identified habitat for individuals of all species on the Federal threatened or endangered list.

2) Policy: Maintenance of a minimal amount of suitable habitat, including the old-growth component, in order to maintain viable populations of threatened or endangered species. This includes limiting or excluding timber harvesting to meet these requirements.

b. State Listed Species:

1) Objective: Provide adequate protection for fish and wildlife considered to be threatened, rare, or endangered by the State agency.

2) Policy: Through cooperative agreements with the State agencies, plan, develop, maintain; and coordinate programs to provide adequate protection for fish and wildlife considered to be threatened, rare, or endangered by the State agency. Such conservation and rehabilitation shall include, but not be limited to, specific habitat improvement projects and related activities.

Limit or exclude timber harvesting on suitable lands when nonsuitable lands or mitigating measures do not provide adequate protection.

5. Habitat Management

a. Objective: Conservation and rehabilitation of wildlife, fish, and game.

b. Policy: Through cooperative agreements with the State agencies, plan, develop, maintain, and coordinate programs for the conservation and rehabilitation of wildlife, fish, and game.

Such conservation and rehabilitation shall include, but not be limited to, specific habitat improvement projects and related activities. Limit or exclude timber harvesting on suitable lands when nonsuitable lands or mitigating measures do not provide for adequate conservation or rehabilitation.

6. Recreational Areas

a. Objective: Protection of potential and developed high-value recreational areas which includes the visual quality of significant scenic areas identified through the Bureau's planning system.

b. Policy: Take mitigating measures to protect potential and developed high-value recreation areas which includes the visual quality of significant scenic areas. Limit or exclude timber harvesting where mitigating measures will not be effective.

Appendix B

DEVELOPMENT OF THE PROPOSED ACTION

Defining the proposed action is the last phase of the planning process prior to preparation of the EIS. Alternatives to the proposed action are identified during the scoping phase of the environmental analysis process. Each alternative analyzed in this EIS contains a mix of variables encompassing a range of choices for decisionmakers as required by the CEQ Regulations (40 CFR 1502.2 (2)).

The primary variables used to determine sustained yield allowable cut are land classification, acres allocated to timber production and enhancement of growth assumed from specific development practices or treatments. Following are brief descriptions of the inventories and processes employed to determine the allowable cut level for the proposed action and each alternative.

Land Classification and Inventory

Timber Production Capability Classification

Timber Production Capability Classification (TPCC) for the SYUs was initiated in 1972. The purpose of TPCC is to categorize BLM-administered land according to its physical and biological capacity to produce timber. TPCC was conducted in accordance with Oregon Manual Supplement 5250.

TPCC identifies commercial coniferous forest land capable of producing timber on a sustained yield basis. These lands form the timber production base for computation of the annual allowable harvest. Approximately 130,700 acres are identified in this category. TPCC also identifies about 12,000 acres of commercial coniferous forest land which cannot be harvested without significant site degradation. These lands are excluded from the timber production base because economically feasible technology is not available to mitigate damage. The remainder of the SYUs' 159,900 acres consists of hardwoods, non-forest or non-commercial forest. As new data become available from on-site stand examinations or improvements occur in technology, some classifications may be changed.

Operations Inventory

For BLM to effectively manage timber, specific information about the location and current condition of the various forest types on the land base must be available to the managers. This is accomplished through the Operations Inventory (OI) in accordance with procedures contained in the Operations Inventory Handbook (STORMS).

The OI is an intensive inventory providing forest type maps which show the location and classification of each homogeneous forest type island (see Glossary). OI record cards list acreages, volumes, silvicultural needs and opportunities for application of forest management practices on each type island. OI thus provides a basis for establishing priorities for treatment according to stand conditions and productivity.

1978 Forest Reinventory

A reinventory of commercial forest land in the SYUs was completed in 1979 employing procedures for extensive inventory (see Glossary) jointly developed by the USFS and BLM. The reinventory is based on the design used for determination of the present allowable cut. It has been refined to include stratification of commercial forest land based on information obtained from the TPCC and OI.

The reinventory indicates a forest distribution as displayed in Table B-1. Age classes range from non-stocked, where reproduction has not been established, to 700 years.

Table B-1 Existing Acres by Age Class
on All BLM-Administered Forest Lands

Age Class	Acres	Age Class	Acres
Non-stocked	9,846	240	818
1-5	6,330	250	503
10	9,336	260	503
20	13,951	270	590
30	11,484	280	736
40	11,052	300	4,040
50	5,015	310	503
60	3,828	330	503
70	5,401	370	503
80	6,604	390	315
90	8,905	400	5,540
100	13,858	410	1,091
110	4,229	420	3,026
120	3,599	430	1,004
130	3,751	440	503
140	2,247	450	590
160	593	460	503
190	733	470	503
200	466	500	818
210	1,214	550	1,128
220	590	700	590
230	736	Total	148,078

Other Resource Inventories

Inventories were conducted to identify and categorize specific capability and potential of resources other than timber. Recreation planners applied the BLM's Recreation Information System, an inventory approach for determining inherent potential of the land to support various recreation activities. Visual resource specialists inventoried and classified the SYUs for visual and esthetic considerations. A review and compilation of known cultural resource data (Class I cultural resource inventory) was completed. Wildlife biologists inventoried general habitat conditions and special habitats, such as northern spotted owl nest sites. Fisheries biologists conducted surveys of streams within the district. Botanical surveys for threatened and endangered plants were initiated for the Salem District in September 1978 and are updated yearly.

Land Use Allocation

During the planning process, broad land use alternatives were identified and reviewed by the District to assess their effects. These alternatives were circulated for public review and comment in 1981. Scoping (see Appendix C) of the EIS led to the conclusion that four of these land use allocation alternatives (some slightly modified) were important enough to analyze in depth (Alternatives 1-4 in Table B-2). Alternatives 5 and 6 are modifications of the proposed action (with same land allocations), and Alternative 7 is based on land allocations used in the 1972 allowable cut calculations.

One of the many factors examined in alternatives assessment was timber harvest foregone due to land allocations for other resource values. Table B-3 is a summary of the data used in this part of the assessment.

When final timber management decisions are made, they will form the management prescriptions. Similarly, actions for other resources, e.g., habitat management plans, will be within land use plan guidelines.

Table B-3 Timber Harvest Foregone Due to Land Use Allocations

Land Use	Alternatives (MM bd. ft./year)					
Category	PA,5,6	1	2	3	4	7
No Planned Harvest						
VRM	1.4	0	1.7	2.6	4.4	2.0
Recreation Sites/Lands	1.7	1.8	1.0	0.2	8.1	2.4
Riparian Zones	6.2	0	4.0	3.4	3.7	0.7
Wildlife Habitat Areas	0	0	1.7	8.5	0	0
Misc. (Natural, Cultural, etc.)	0.9	0.6	0.7	0.6	1.1	0
Constrained Harvest						
ACEC	0.6	0	0	0	0	0
VRM	0.5	0	4.9	3.4	2.8	0.2
Wildlife Habitat Areas	8.4	0	0	0	26.3	0
Riparian Zones	0	0	2.3	0	0	1.0
Misc.	0	0	1.2	0	0	0.1
Total	19.7	2.4	17.5	18.7	46.4	6.4

Table B-2 Land Use Allocation Proposed for the EIS Alternatives Including the Proposed Action

	Alternatives Including the Proposed Action (Acres)					
	PA, 5&6	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 7[1]
No Planned Timber Harvest						
Non-Forest Lands	11,695	11,695	11,695	11,695	11,695	8,920
Fragile Site Withdrawals[2]	10,958	0	10,958	10,958	10,958	8,863
Reforestation Withdrawals	953	0	916	953	1,051	0
MFP Withdrawals	9,100	889	7,604	14,233	17,118	7,721
VRM	(1,179)	(0)	(1,421)	(2,360)	(4,320)	(2,983)
Recreation Sites/Lands	(1,454)	(734)	(793)	(200)	(8,000)	(3,599)
Riparian Zones	(5,520)	(0)	(3,277)	(3,193)	(3,638)	(1,139)
Wildlife Habitat Areas	(0)	(0)	(1,500)	(7,880)	(0)	(0)
Misc. (Natural, Cultural, etc.)	(947)	(155)	(613)	(600)	(1,160)	(0)
Hardwood Lands	5,035	5,031	5,031	5,091	5,276	4,013
Scattered Tracts	125	125	125	125	125	173
Sub-total	37,866	17,740	36,329	43,055	46,223	29,690
Planned Timber Harvest						
Intensive Base	102,901	141,836	102,288	108,944	70,099	120,329
Constrained Base						
ACEC	3,585	0	0	0	0	0
VRM	3,348	0	12,066	7,520	6,400	1,517
Wildlife Habitat Areas	11,763	0	0	0	37,080	0
Riparian Zones	0	0	5,657	0	0	7,510
Municipal Watersheds	0	0	2,835	0	0	0
Recreation/Education Areas	0	0	247	0	0	852
Other[3]						
Stand Conversion	435	322	476	379	96	0
Sub-total	122,032	142,158	123,569	116,843	113,675	130,208
Total SYUs Acres	159,898	159,898	159,898	159,898	159,898	159,898

[1] Land use allocations for this alternative (7) result from land classification and inventory programs used in the 1970 planning process.

[2] See Glossary (Withdrawals).

[3] Unmerchantable hardwoods and brush fields that are included in the allowable cut computation after conversion to coniferous plantations.

Allowable Cut Computation

Forest Simulation Model

A computerized forest simulation model (SIMIX) is used to determine the highest sustainable allowable cut for each alternative. SIMIX calculates the allowable cut associated with the stated forest management plan. It can maximize an even-flow level of cut for some specific management regime, or a series of cut levels may be specified for as many as the first 10 decades followed by an even-flow level for the remainder of the projected period (40 decades). This lengthy projection period is not an attempt at a 400-year plan. It is used only to assure that the planned allowable cut can be sustained.

The clearcut option of SIMIX was utilized, since clearcutting is the predominant harvest method in all alternatives. In order to provide a more accurate estimation of the total wood fiber in logs which could be sold for lumber and plywood, the allowable cut is computed and projected into the future on the basis of cubic feet. Based upon the age and size of timber projected for harvest during the first decade, the computed even-flow cubic foot volume will be converted to Scribner volume for sale purposes.

SIMIX computes the harvest level based on present inventory and projected growth resulting from the application of certain management practices (mortality salvage, precommercial and commercial thinning, commercial thinning only, genetic improvement and final harvest cuts). Fertilization is included in conjunction with one or more of the above treatments. Inputs to SIMIX are type and timing of treatments and number of acres to be treated. No rotation age is set. Instead, a minimum cutting age constraint is specified. SIMIX is not designed to handle economic values or costs, and it does not seek out alternative schedules or strategies.

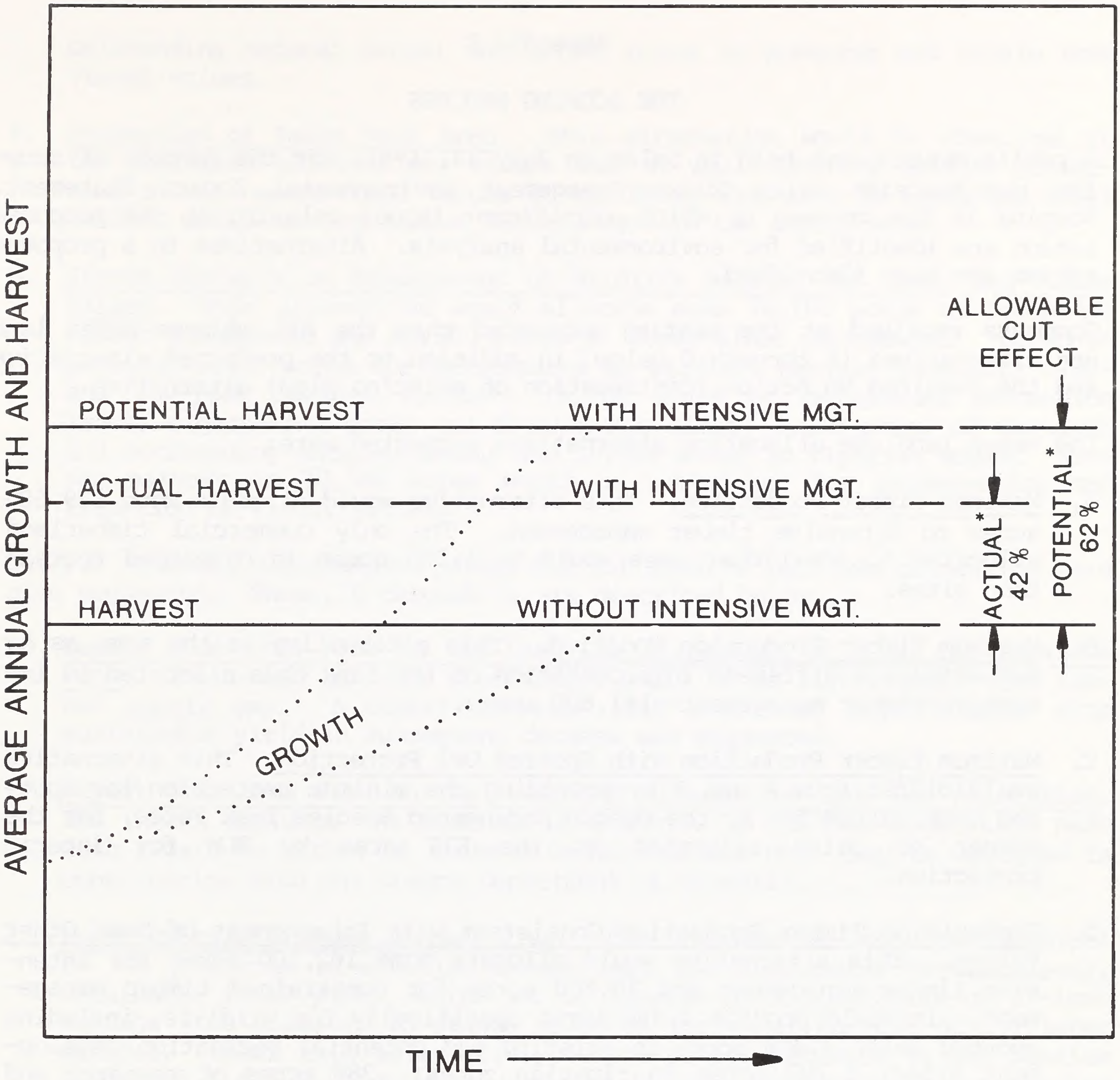
The model, designed for forests under an even-aged system of management, produces output data by decades for each age and treatment class and summarizes them numerically and graphically. These data include level of growing stock, annual growth, acreage by silvicultural practice and volume by harvesting practice. Consequently, it permits alternative plans to be evaluated on the basis of their respective production levels and fiscal requirements and serves as a basis for programming personnel and funds for the alternative selected. In effect, a management plan is developed that schedules the production from commercial thinning, mortality salvage and final harvest operations and also the acreages for such treatments as reforestation and precommercial thinning.

The Allowable Cut Effect (ACE)

A forest that is composed primarily of old-growth timber and recently cutover stands exhibits a relatively low average annual growth. This results from slow or negative growth of the old stands and the fact that growth is not measurable (in end-product terms) in the young stands until they reach 20 to 30 years of age. Such a forest is in transition from an unmanaged to a managed or regulated state. Regulation is achieved when annual harvest and annual growth are in equilibrium and the forest is producing wood, in terms of desired product objective, at maximum capacity. At this point, maximum yield on a sustainable basis is reached. To compute an allowable cut on a forest in the transition state, using growth rates not reflecting anticipated impacts of future management, would be extremely conservative and would greatly lengthen the time until the regulated state was achieved. BLM uses an alternative approach which is to project growth into the future based upon assumptions about management levels and to utilize excess harvest-age timber to bridge the time gap until the ultimate growth level is achieved. This process of taking credit now for future growth increases expected to result from management has been termed the "Allowable Cut Effect" (ACE).

Figure B-1 illustrates this process in the context of conditions found in the SYUs, before land use allocations were made for other resource activities. This forest is in the early to middle transition stage and, as the recent inventory found, it has a relatively low average annual growth rate. An initial computation was made that assumed no intensive management practices were performed. Under this scheme, stands were projected to grow along a growth curve typifying normal unmanaged forests. The lower growth curve in Figure B-1 shows the average annual growth path projected from these assumptions. When tested on the allowable cut model, the current level of harvest age timber and existing age-class distribution of the forest yielded a maximum nondeclining harvest level of 12.2 million cubic feet in a long phase-in to a regulated forest condition.

Next, a high level of management was assumed. Practices (see Chapter 1, Forest Management Treatments and Design Elements) such as genetic improvement, precommercial and commercial thinning, stand conversion, fertilization and mortality salvage were used in projecting yield functions. The basis for most of these projections was the DFIT model. The higher growth curve in Figure B-1 shows the average annual growth path resulting from the intensive management assumptions. When tested on the allowable cut model, it was determined that there was only enough harvest age timber available to take credit for a portion of the expected future growth increases. For full ACE credit to apply, there must be enough harvestable timber available to make the transition from the current slower-growing forest to the regulated, intensively-managed forest of the future growing at a maximum rate. Since this was not the case in the SYUs, the allowable cut effect applied was limited to about 68 percent of the projected potential allowable cut effect. To set a cut level higher than the "actual" would cause a drop in future cut levels, a violation of Bureau policy. Essentially, the limited volume of standing harvest age timber adds an element of conservatism to the allowable cut computation process, because it limits the credit that can be taken now for future intensive management.



* Percent increase above the harvest level computed without intensive management.

FIGURE B-1

ALLOWABLE CUT EFFECT

Appendix C

THE SCOPING PROCESS

A public meeting was held in Salem on July 14, 1981, for the purpose of scoping the Eastside Salem Timber Management Environmental Impact Statement. Scoping is the process by which significant issues relating to the proposed action are identified for environmental analysis. Alternatives to a proposed action are also identified.

Comments received at the meeting suggested that the EIS address seven land use alternatives (A through G below) in addition to the preferred alternative and the required No Action (continuation of existing plan) alternative.

The seven land use allocation alternatives suggested were:

A. Maximum Timber Production. This alternative would allocate some 129,500 acres to intensive timber management. The only commercial timberland allocated to non-timber uses would be 1,500 acres in developed recreation sites.

B. Maximum Timber Production Modified. This alternative is the same as A, but entails a different interpretation of the land thus allocated to intensive timber management--141,800 acres.

C. Maximum Timber Production with Spotted Owl Protection. This alternative would differ from A and B by providing the minimum protection for spotted owls called for by the Oregon Endangered Species Task Force, for the number of pairs allocated to the EIS area by BLM for interim protection.

D. Emphasis on Timber Production Consistent with Enhancement of Some Other Values. This alternative would allocate some 102,300 acres for intensive timber management and 20,800 acres for constrained timber management. It would provide 2,400 acres specifically for wildlife, including spotted owls; 4,400 acres in existing and potential recreation development sites; 6,700 acres in riparian zones; 380 acres of research and outstanding natural areas; and 11,600 acres to preserve and retain some visual values.1/

E. Moderate Emphasis on Timber Production Combined with Preservation of Old Growth and Enhancement of Other Non-Timber Values. This alternative would allocate some 108,900 acres to intensive timber management and 7,500 acres to constrained management. It would provide 10,960 acres of mostly old-growth conifer habitat specifically for wildlife (no timber harvest); 4,100 acres of recreation sightseeing areas and development sites; 5,800 acres in riparian zones; 1,720 acres of research and

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1/ Non-timber allocations are not additive due to overlap and cannot be compared to intensive and constrained timber allocations due to inclusion of non-forest lands, fragile sites, etc.

outstanding natural areas; and 22,600 acres to preserve and retain some visual values.

F. Protection of Table Rock Area. This alternative would be identical to the preferred alternative, except that it would provide greater protection to the recreational values of the Table Rock area by expanding trail buffers and extending timber harvest ages in the buffer zone.

G. Strong Emphasis on Enhancement of Wildlife Habitat and Other Non-Timber Values. This alternative would allocate some 70,100 acres to intensive timber management and 43,500 acres to constrained management. It would provide 45,480 acres for maintenance of wildlife habitat diversity (200- and 350-year harvest cycles); 16,600 acres of designated recreation lands, sightseeing areas and development sites; 1,880 acres of research and outstanding natural areas; and 10,900 acres in riparian zones. Timber harvest on 30,300 acres would be restricted for preservation and retention of visual values.

Several relevant alternatives which did not involve land use allocation were also suggested. These, H through M, are described below.

H. Depart from Even Flow on the Land Use Allocation of B on the Previous Page. The intent of this alternative would be to fill a short-term timber supply gap. A modest increase that would not significantly drop sustainable yield in subsequent decades was suggested.

I. Depart from Even Flow on the Preferred Alternative Land Use Allocation. The intent would be the same as in H above. A further suggestion made with regard to either of these alternatives was that they be designed in consultation with the Oregon Department of Forestry.

J. Lower Average Minimum Harvest Size. This alternative would be identical to the preferred alternative except that the sustainable harvest level, attainable in 60 years, would not be limited by a constraint of 17-inch average tree diameter in stands selected for final harvest during later decades. Under this alternative, future decade harvests in the Santiam Sustained Yield Unit would be expected to take 40-year-old stands during one decade and 50-year-old stands during other decades.

K. Minimum Harvest Age of 70 Years. The assumption would be made that no timber stands younger than approximately 70 years would be harvested in any future decade.

L. Combine Allowable Cuts for the Two Sustained Yield Units. In this alternative the data base for the two sustained yield units involved in the EIS area would be combined for a single allowable harvest calculation.

M. No Control of Competing Vegetation with Herbicides. This alternative is identical to the preferred alternative except that no herbicides would be used to control grass, brush or hardwood species growing in competition with commercial conifers. Control of vegetation for timber management by burning, grazing or using mechanical or manual means would be prescribed where economically feasible.

Our review of these suggestions after the meeting led us to the following conclusions:

A & B - These alternatives are, in concept, identical. The 141,800 acres properly defines the area that would be available for intensive timber management. The alternative is important to define one end of the range of reasonable alternatives.

C - This alternative is merely an intermediate step between Alternatives B and D, with no additional dimension. Interest in it stemmed from the fact that it would specifically focus attention on the economic trade-offs involved in implementing the recommendations of the Task Force. Analysis of Alternative D would also address this, as well as other issues. For those who are interested in the specific trade-off involved in this one allocation, we have calculated that such an alternative would permit annual timber harvests of 2.2 MM bd. ft. less than Alternative B.

D - This alternative was widely supported for analysis in the public meeting. No modifications were suggested.

E - Some comments in the public meeting suggested that the original definition of Alternative E by BLM staff was confusing. Definition of this as a useful mid-range alternative will be clarified.

F - This alternative would address a very specific issue with only a few impacts notably different from those of the preferred alternative. To address that issue most efficiently, it can be combined with Alternative E.

G - This alternative is important to define one end of the range of reasonable alternatives.

H & I - Discussion with staff of the Oregon Department of Forestry brought out the opinion that the land use allocation alternatives which emphasize timber harvest would be essentially responsive to the expected timber supply deficit in the EIS area. Thus, analysis of a departure from even flow in the preferred alternative land use allocation is most relevant. A one-decade increase in harvest which caused subsequent harvests to fall only 1 MM bd. ft. below the non-declining even-flow level would be most relevant to analyze, on the preferred alternative timber management base. Department of Forestry staff assumed that technology advances in a decade would easily compensate for the assumed harvest decline. The one-decade increase would produce 6 MM bd. ft. additional annual harvest while causing the 1 MM bd. ft. drop for only the second and third decades.

J - This alternative tests an issue which is useful to analyze. For efficiency it can be combined with Alternative I to provide a single alternative analyzing all realistic options to accelerate the harvest on a given land use allocation base. The minimum final harvest age would be lower only in the Santiam SYU, dropping from 60 years to 50 years in decades 6-8 and 10-32 and to 40 years in decade 9. This would produce an additional 2 MM bd. ft. of annual harvest. Timber in these younger stands would have an average diameter of 13 inches and 11 inches respectively.

K - Of all the alternatives suggested at the scoping meeting, this one received by far the least audience support for analysis. The main thrust of it is to balance Alternative J, but it does not address any issue raised during the scoping process. The alternative would result in an allowable cut some 15 MM bd. ft. below that of the preferred alternative.

L - Based on past experience with such combined allowable cut runs, BLM staff does not believe this alternative would look significantly different than the separate runs. Analysis of impacts on a separate EIS alternative would not appear to serve any useful purpose.

M - This alternative would address an issue which is significant in most of western Oregon.

It was concluded that the EIS should analyze the following alternatives:

The proposed action (preferred alternative)
Alternative 1 (B and H combined): Maximum Timber Production.
Alternative 2 (D): Emphasis on Timber Production, Enhancement of Some Other Values.
Alternative 3 (E and F combined): Moderate Emphasis on Timber Production, Preservation of Old-Growth Habitat, Enhancement of Other Non-timber Values.
Alternative 4 (G): Strong Emphasis on Enhancement of Wildlife Habitat and Other Non-timber Values.
Alternative 5 (I and J combined): Accelerate Timber Harvest from Preferred Alternative Timber Management Base.
Alternative 6 (M): No Control of Competing Vegetation with Herbicides.
Alternative 7: No Action (no change).

Discussion of the possible alternatives with the Salem District's Multiple Use Advisory Council on July 15 brought out the suggestion that the aerial herbicide spray stream buffers should be limited to 75 feet in the Maximum Timber alternative. Generally, this alternative is considered to be constrained by the requirements of the Oregon Forest Practices Act. The herbicide buffers in it will be consistent with those requirements.

Attendees at the public scoping meeting provided useful comments on issues that should be addressed in the EIS. Included were suggestions on more specific definition of issues related to water supply, wildlife, fish, recreation and economic aspects of the alternatives.

Opinion of the attendees was mixed on the question of whether to hold an unstructured public meeting or a formal hearing after release of the Draft EIS. In light of the divergent opinions on this issue, a public meeting with maximum opportunity for dialogue between the public and Bureau officials seems most useful.

Appendix D

ECOSYSTEM MANAGEMENT

This appendix contains a brief discussion of ecosystem management and its relationship to the proposed action and Alternative 4. Other alternatives would not achieve the objectives of ecosystem management.

Ecosystem management is defined as retention of all interacting natural systems (consisting of both living and nonliving components) that presently occur or could occur within the SYUs. Ecosystem management would be achieved through maintenance of maximum habitat diversity which, in turn, would provide for maximum diversity of wildlife species. In the forest environment, this means managing for all successional stages, each with unique horizontal and vertical structure, in addition to special habitats such as dry meadows, wetlands, talus slopes, cliffs and riparian zones. Besides simply retaining forested habitats, special efforts would be made to maintain proper stand conditions for wildlife. This would be necessary because management activities such as mortality salvage and commercial thinning could adversely alter structure of the natural stand important to wildlife.

Ecosystem management provides a comprehensive approach to the management of the estimated 327 species of terrestrial vertebrates in the SYUs. However, featured species such as elk, deer and the northern spotted owl would receive special emphasis within the comprehensive ecosystem approach.

In the following discussion of the proposed action and Alternative 4, old-growth (196+ years old) and mature (116-195 years old) habitats are emphasized because of relative scarcity in the SYUs. However, all existing habitat types would be retained under the proposed action and Alternative 4.

Proposed Action

This alternative would retain old-growth coniferous forest by use of 350-year harvest rotation in a large block (1,920 acres) and small block (240 acres) pattern within a 2-4 mile-wide corridor over BLM-administered lands in the SYUs. Management of the blocks would proceed as follows: (1) undisturbed conditions would be maintained on oldest forest stands until 640 acres of contiguous old growth were available in large blocks and 80 acres in small blocks; (2) younger forest stages would be harvested within the large and small blocks to develop an even distribution of age classes to perpetuate long harvest rotations; and (3) areas would be reforested after harvesting, with natural stand development allowed until next harvest.

The large block size of 1,920 acres was selected to maintain 640 acres as old-growth and mature forest and 1,280 acres which would eventually serve as replacement for harvested older stands. The core size of 640 acres was required to provide habitat for secretive and/or wide-ranging species such as fisher and marten. An identical management scheme was utilized for the small blocks except that an area of 240 acres was selected to maintain 80 acres as old-growth forest and 160 acres as replacement stands. The stand size of 80 acres was a minimum requirement of forest interior birds.

These small blocks of old-growth forest would be distributed at approximately 1-mile intervals to encourage animal movement between both small and large blocks.

Private and public lands fall within the corridor. However, only selected BLM-administered land would be managed for wildlife. The corridor would facilitate gene flow within those species which find their optimum habitats in older seral stages. Corridors would prevent genetic isolation and maintain the current diversity of wildlife species finding optimum habitat in older coniferous forests.

Alternative 4

Techniques to manage older coniferous forest would be identical to those of the proposed action except that blocks would be evenly distributed throughout BLM-administered land (not in a corridor) and a 200-year harvest rotation would be initiated in addition to the 350-year rotation plan.

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use												
			Conifer Habitat						Other Habitat						
Mammals	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Common Opossum (Didelphis marsupialis)	P	C	U	U	U	U			U	O	U	O	U		
Vagrant Shrew (Sorex vagrans)	P	C	U	U	U	U	U	U	U	O	U	O		U	
Dusky Shrew (Sorex obscurus)	P	C	U	U	U	U	U	U	U	O	U	O		U	
Marsh Shrew (Sorex bendirii)	P	C	U	U	U	U	U	U	U	O		O			
Trowbridge's Shrew (Sorex trowbridgii)	P	C	U	U	U	U	U	U	U	O	U	O			
Shrew-mole (Neurotrichus gibbsii)	P	C	U	U	U	U	O	O	U	U	U	U		U	
Townsend's Mole (Scapanus townsendii)	P	C	O	U	U	U			U		O				
Coast Mole (Scapanus orarius)	P	C	O	U	U	U	U	U			O				
Little Brown Myotis (Myotis lucifugus)	P	C	U	U	U	U	O	O	U	U	U	U	O	O	U
Yuma Myotis (Myotis yumanensis)	P	U		U	U	U	O	O	U	O		O	O	O	
Long-eared Myotis (Myotis evotis)	P	C	U	U	U	U	O	O	U	U	U	U	O	O	
Long-legged Myotis (Myotis volans)	P	C	U	U	U	U	O	O	U	U	U	U	O	O	U
California Myotis (Myotis californicus)	P	C	U	U	U	U	O	O	U	U	U	U	O	O	
Silver-haired Bat (Lasionycteris noctivagans)	P	C	U	U	U	U	O	O	U	U	U	U	O	O	U
Big Brown Bat (Eptesicus fuscus)	P	C	U	U	U	U	O	O	U	U	U	U	O	O	U
Hoary Bat (Lasiurus cinereus)	P	C		U	U	U	O	O	U	O		U	U	U	
Townsend's Big-eared Bat (Plecotus townsendii)	P	C	U	U	U	U	U	U	U	U	U			O	U
Pallid Bat (Antrozous pallidus)	P	R	U	U	U				U	O	U	O	U	O	
Pika (Ochotona princeps)	P	R												O	
Brush Rabbit (Sylvilagus bachmani)	P	C	U	U	U				U	U	U	U			

LEGEND

Resident
P = Permanent
W = Winter
M = Migratory
S = Summer

Relative Abundance
C = Common
U = Uncommon
R = Rare
O = Occasional

Habitat Use
U = Utilizes
O = Optimum

Appendix E WILDLIFE SPECIES & HABITAT USE

	Habitat Use														
	Conifer Habitat								Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Eastern Cottontail (Sylvilagus floridanus)	P	R	U	U					U	U	U	U			
Snowshoe Hare (Lepus americanus)	P	C	U	U	U	U	U	U	U	U	U	U			
Mountain Beaver (Aplodontia rufa)	P	C	U	U	U	U	U	U	U	U	U	U			
Townsend's Chipmunk (Eutamias townsendii)	P	C	U	U	U	U	U	U	U	U	U	U	U	U	
California Ground Squirrel (Spermophilus beecheyi)	P	C	U	U					U	U	U			U	
Western Gray Squirrel (Sciurus griseus)	P	R			U	U	U	U	O	U			O		
Douglas Squirrel (Tamiasciurus douglasii)	P	C			U	U	O	O	U	U			O		
Northern Flying Squirrel (Glaucomys sabrinus)	P	C				U	O	O	U	U			O		
Mountain Pocket Gopher (Thomomys monticola)	P	U	O	U							O				
Western Pocket Gopher (Thomomys mazama)	P	C	O	U							O				
Camas Pocket Gopher (Thomomys bulbivorus)	P	U	O	U							O				
Beaver (Castor canadensis)	P	C	U	U	U	U	U	U	U	O	U	O			
Deer Mouse (Peromyscus maniculatus)	P	C	U	U	U	U	U	U	U	U	U	U	U	U	
Dusky-footed Woodrat (Neotoma fuscipes)	P	C	U	U	U	U	U	U	U	U	U	U	U	U	
Bushy-tailed Woodrat (Neotoma cinerea)	P	C	U	U	U	U	O	O	U	U	U	U	U	U	
Western Red-backed Vole (Clethrionomys occidentalis)	P	C	U	U	U	U	O	O	U	U	U	U		U	
Red Tree Vole (Phenacomys longicaudus)	P	C				U	O	O		U		U	U		
Creeping Vole (Microtus oregoni)	P	C	U	U	U	U	U	U	U	U	U	U			
Water Vole (Microtus richardsoni)	P	R								O		O			
Townsend's Vole (Microtus townsendii)	P	C	U	U	U				U	O	U	O			
Long-tailed Vole (Microtus longicaudus)	P	C	U	U	U				U	O	U	O		U	
Muskrat (Ondatra zibethicus)	P	C	U							O		O			
Norway Rat (Rattus norvegicus)	P	C													U
House Mouse (Mus musculus)	P	C													U
Pacific Jumping Mouse (Zapus trinotatus)	P	C	U	U	U	U	U	U	U	O	U	O			
Porcupine (Erethizon dorsatum)	P	C	U	U	U	U	U	U	U	U	U	U	U	U	
Nutria (Myocaster coypus)	P	C								O		O			
Coyote (Canis latrans)	P	C	U	U	U	U	U	U	U	U	U	U		U	

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use												
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Red Fox (Vulpes fulva)	P	C	U	U	U	U	U	U	U	U	U	U			
Gray Fox (Urocyon cinereoargenteus)	P	C	U	U	U	U	U	U	U	U	U	U		U	
Black Bear (Ursus americanus)	P	C	U	U	U	U	O	O	U	U	U	U	U	U	
Raccoon (Procyon lotor)	P	C	U	U	U	U	U	U	U	O	U	O	U	U	
Marten (Martes americana)	P	R			U	U	O	O	U	U		U	U	U	
Fisher (Martes pennanti)	P	R	U	U	U	U	O	O	U	U	U	U	U	U	
Ermine (Mustela erminea)	P	C	U	U	U	U	O	O	U	U	U	O	U	U	
Long-tailed Weasel (Mustela frenata)	P	C	U	U	U	U	U	U	U	U	U	U	U	U	
Mink (Mustela vison)	P	C	U	U	U	U	U	U	U	O	U	O			
Western Spotted Skunk (Spilogale gracilis)	P	C	U	U	U				U	U	U	U			
Striped Skunk (Mephitis mephitis)	P	C	U	U	U				U	U	U	U		U	
River Otter (Lutra canadensis)	P	U								O		O			
Mountain Lion (Felis concolor)	P	U	U	U	U	U	O	O	U	U	U	U		O	
Bobcat (Felis rufus)	P	C	U	U	U	U	O	O	U	U	U	U		O	
Roosevelt Elk (Cervus elaphus roosevelti)	P	C	U	U	U	U	O	O	U	O	O	U			
Columbia Black-tailed Deer (Odocoileus hemionus columbianus)	P	C	O	O	U	U	O	O	U	U	U	U			
Birds															
Common Loon (Gavia immer)	P	U								O		O			
Arctic Loon (Gavia arctica)	W	R								O		O			
Red Throated Loon (Gavia stellata)	W	R								O		O			
Red Necked Grebe (Podiceps griseigena)	P	R								O		O			
Horned Grebe (Podiceps auritus)	P	R								O		O			
Eared Grebe (Podiceps nigricollis)	P	R								O		O			
Western Grebe (Aechmophorus occidentalis)	P	R								O		O			
Pied-billed Grebe (Podilymbus podiceps)	P	U								O		O			

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use											
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Double-crested Cormorant (Phalacrocorax auritus)	P	U								O		O			
Great Blue Heron (Ardea herodias)	P	U	U	U	U	U	O	O	U	O		O	U		
Green Heron (Butorides striatus)	P	U					U	U		O		O			
Great Egret (Casmerodius albus)	P	R								O		O			
Black-crowned Night Heron (Nycticorax nycticorax)	P	R					U	U		O		O			
American Bittern (Botarus lentiginosus)	P	R								O		O			
Whistling Swan (Cygnus columbianus)	W	R	U							O		O			
Canada Goose (Branta canadensis)	P	U	U							O		O			
White-fronted Goose (Anser albifrons)	M	R	U							O		O			
Snow Goose (Anser caerulescens)	M	R	U							O		O			
Mallard (Anas platyrhynchos)	P	C	U	U	U	U	U	U	U	O		O			
Gadwall (Anas strepera)	P	R	U							O		O			
Pintail (Anas acuta)	P	C	U							O		O			
Green-winged Teal (Anas crecca)	P	C	U							O		O			
Blue-winged Teal (Anas discors)	S	U	U							O		O			
Cinnamon Teal (Anas cyanoptera)	S	U	U							O		O			
European Wigeon (Anas penelope)	W	R	U							O		O			
American Wigeon (Anas americana)	P	C	U							O		O			
Northern Shoveler (Anas clypeata)	P	R	U							O		O			
Wood Duck (Aix sponsa)	P	U				U	U	U	U	O		O	O		
Redhead (Aythya americana)	P	R	U							O		O			
Ring-necked Duck (Aythya collaris)	P	U	U							O		O			
Canvasback (Aythya valisineria)	P	U	U							O		O			
Greater Scaup (Aythya marila)	W	U	U							O		O			
Lesser Scaup (Aythya affinis)	P	U	U							O		O			
Common Goldeneye (Bucephala clangula)	W	U								O		O	O		
Barrow's Goldeneye (Bucephela islandica)	P	U								O		O	O		

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use												
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Bufflehead (Bucephela albeola)	W	U					U	U		O		O	O		
Harlequin Duck (Histrionicus histrionicus)	P	U								O		O			
White-winged Scoter (Melanitta fusca)	P	R								O		O			
Surf Scoter (Melanitta perspicillata)	P	R								O		O			
Black Scoter (Melanitta nigra)	P	R								O		O			
Ruddy Duck (Oxyura jamaicensis)	P	U	U							O		O			
Hooded Merganser (Mergus cucullatus)	P	U					U	U	U	O		O	O		
Common Merganser (Mergus merganser)	P	U					U	U	U	O		O	O		
Red-breasted Merganser (Mergus serrator)	W	U								O		O			
Turkey Vulture (Cathartes aura)	S	C	U	U				U	U	U	U		U	O	
White-tailed Kite (Elanus leucurus)	P	R	U	U						U	U	U			
Goshawk (Accipiter gentilis)	P	R				U	O	O	U	U	U		U		
Sharp-shinned Hawk (Accipiter striatus)	P	U	U	U	U	U	U	U	U	U	U	U	U		
Cooper's Hawk (Accipiter cooperii)	P	U	U	U	U	U	U	U	U	U	U	U	U		
Red-tailed Hawk (Buteo jamaicensis)	P	U	U	U		U	O	O	U	U	U	U	O	U	
Swainson's Hawk (Buteo swainsoni)	S	O	U	U							U			U	
Rough-legged Hawk (Buteo lagopus)	W	R	U	U					U	U	U	U	U		
Ferruginous Hawk (Buteo regalis)	S	O	U	U							U			U	
Golden Eagle (Aguila chrysaetos)	P	O	U	U		U	O	O	U	U	U	U	O	O	
Bald Eagle (Haliaetus leucocephalus)	P	U	U	U		U	O	O	U	O	U	O	O	U	
Marsh Hawk (Circus cyaneus)	P	O	U							U	U	O			
Osprey (Pandion haliaetus)	S	U					O	O		O	O	O	O	U	
Peregrine Falcon (Falco peregrinus)	P	O	U	U			U	U	U	U	U	U	U	O	
Merlin (Falco columbarius)	P	R	U	U	U	U			U	U	U	U		U	
American Kestrel (Falco sparverius)	P	C	O	U	U	U	U	U	U	U	O	U	O	U	
Blue Grouse (Pendragapus obscurus)	P	C	U	U	O	O	U	U	U	U	U	U			
Ruffed Grouse (Bonasa umbellus)	P	U		U	U	U	U		U	O	U	U			

Appendix E WILDLIFE SPECIES & HABITAT USE

	Habitat Use														
	Conifer Habitat								Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Bobwhite (Colinus virginianus)	P	R	U	U	U				U	U	U	U			
California Quail (Lophortyx californicus)	P	U	U	U	U				U	U	U	U			
Mountain Quail (Oreortyx pictus)	P	U	U	U	U				U	U	U	U			
Ring-necked Pheasant (Phasianus colchicus)	P	U	U	U					U	U	U	U			
Virginia Rail (Rallus limicola)	P	U	U	U						O		O			
Sora (Porzana carolina)	S	U								O		O			
American Coot (Fulica americana)	P	C								O		O			
Semipalmated Plover (Calidris pusilla)	M	U								O		O			
Killdeer (Charadrius vociferus)	P	C	U							O		O			
American Golden Plover (Pluvialis dominica)	M	R								O		O			
Black-bellied Plover (Pluvialis squatarola)	W	U								O		O			
Black Turnstone (Arenaria melanocephala)	W	O								U		U		U	U
Common Snipe (Capella gallinago)	P	U		U						O		O			
Long-billed Curlew (Numenius americanus)	S	R	U							O		O			
Spotted Sandpiper (Actitis macularia)	P	U								O		O			
Solitary Sandpiper (Tringa solitaria)	M	R								O		O			
Willet (Catoptrophorus semipalmatus)	P	O								O		O			
Greater Yellowlegs (Tringa melanoleucus)	W	U	U							O		O			
Lesser Yellowlegs (Tringa flavipes)	M	O	U							O		O			
Pectoral Sandpiper (Calidris melanotos)	M	U								O		O			
Baird's Sandpiper (Calidris bairdii)	M	R								O		O			
Least Sandpiper (Calidris minutilla)	W	U								O		O			
Dunlin (Calidris alpina)	W	U								O		O			
Short-billed Dowitcher (Limnodromus griseus)	M	U								O		O			
Long-billed Dowitcher (Limnodromus scolopaceus)	M	U								O		O			
Western Sandpiper (Calidris mauri)	M	U								O		O			
Sanderling (Calidris alba)	W	R								O		O			

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use												
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Red Phalarope (Phalaropus fulicarius)	M	O								O		O			
Wilson's Phalarope (Steganopus tricolor)	S	R								O		O			
Northern Phalarope (Lobipes lobatus)	M	O								O		O			
Parasitic Jaeger (Stercorarius parasiticus)	M	O								O		O			U
Glaucous Gull (Larus hyperboreus)	W	O								O		O			U
Glaucous-winged Gull (Larus glaucescens)	P	U								O		O			U
Western Gull (Larus occidentalis)	P	R								O		O			U
Herring Gull (Larus argentatus)	W	U								O		O			U
California Gull (Larus californicus)	P	C	U							O		O			U
Ring-billed Gull (Larus delawarensis)	P	U	U							O		O			U
Mew Gull (Larus canus)	W	O								O		O			U
Bonaparte's Gull (Larus philadelphia)	M	U								O		O			U
Common Tern (Sterna hirundo)	M	R								O		O			U
Black Tern (Chlidonias niger)	S	R								O		O			U
Band-tailed Pigeon (Columba fasciata)	S	C	U	O	U	U	O	O	U	U		O	U	U	
Rock Dove (Columba livia)	P	C	U											U	U
Mourning Dove (Zenaida macroura)	P	C	U	U	U	U	U	U	U	U	U	U	U		
Yellow-billed Cuckoo (Coccyzus americanus)	S	O							U	U		U			
Barn Owl (Tyto alba)	P	U	U	U		U	U	U	U	U	U	U	O	O	U
Screech Owl (Otus asio)	P	U	U	U	U	U	O	O	U	O	U	U	O		
Great Horned Owl (Bubo virginianus)	P	U	U	U	U	U	O	O	U	U	U	O	O		
Snowy Owl (Nyctea scandiaca)	W	O	U	U							U	U			U
Pygmy Owl (Glaucidium gnoma)	P	U	U	U	U	U	O	O	U	U	U		O		
Burrowing Owl (Athene cunicularia)	P	O	U								U				
Northern Spotted Owl (Strix occidentalis)	P	U				U	O	O		U			O		
Long-eared Owl (Asio otus)	P	R	U	U	U	U	U	U	U	U	U	U	O		
Short-eared Owl (Asio flammeus)	P	U	U	U						U	U	O			

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use													
			Conifer Habitat						Other Habitat							
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Saw-whet Owl (Aegolius acadicus)	P	R				U	O	O	U	O		O	O		
Common Nighthawk (Chordeiles minor)	S	C	U	U					U	U	U	U		U	
Black Swift (Cypseloides niger)	M	O	U								U			U	
Vaux's Swift (Chaetura vauxi)	S	C	U	U	U		O	O	U	U	U	U	O		U
Anna's Hummingbird (Calypte anna)	P	R	O	O	U				U	U	O	U			
Rufous Hummingbird (Selasphorus rufus)	S	C	O	O	U	U	U	U	U	U	O	U			
Calliope Hummingbird (Stellula calliope)	S	R	U	U						U	U	U			
Belted Kingfisher (Megaceryle alycon)	P	C							U	O		O	U		
Common Flicker (Colaptes auratus)	P	C	U	U	U	U	U	U	U	U	U	U	O	U	
Pileated Woodpecker (Dryocopus pileatus)	P	U					O	O	U	U			O		
Acorn Woodpecker (Melanerpes formicivorus)	P	R							O	U			O		
Lewis' Woodpecker (Melanerpes lewis)	P	U	U	U	U	U	U	U	U	U	U		O		
Yellow-bellied Sapsucker (Sphyrapicus varius)	P	U		U	U	U	O	O	U	O		U	O		
Hairy Woodpecker (Picoides villosus)	P	U		U	U	U	O	O	U	U		U	O		
Downy Woodpecker (Picoides pubescens)	P	C		U	U	U	U	U	O	O		O	O		
Black-backed Three-toed Woodpecker (Picoides articus)	P	R				U	U	U		U		U	O		
Eastern Kingbird (Tyrannus tyrannus)	S	O	U	U	U					U	U	U			
Western Kingbird (Tyrannus verticalis)	S	O	U	U	U				U	U	U	U		U	
Say's Phoebe (Sayornis saya)	P	R	U	U	U				U	U	U	U		U	
Willow Flycatcher (Empidonax traillii)	S	U		U	U				U	O		O			
Hammond's Flycatcher (Empidonax hammondii)	S	U				U	U	O	U	U	U	U	U		U
Western Flycatcher (Empidonax difficilis)	S	U				U	O	O	U	O		O			
Western Wood Pewee (Contopus sordidulus)	S	C			U	U	U	U	U	U		U			
Olive-sided Flycatcher (Nuttallornia borealis)	S	C	U	U	U	U	U	U	U	U		U	U		
Horned Lark (Eremophila alpestris)	P	U	U								U				

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use													
			Conifer Habitat						Other Habitat							
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Violet-green Swallow (Tachycineta thalassina)	S	C	U	U	U	U	U	U	U	U	U	U	O	U	
Tree Swallow (Iridoprocne bicolor)	S	C	U	U			O	O	U	U	U	U	O		
Bank Swallow (Riparia riparia)	S	O	U	U					U	O		O			
Rough-winged Swallow (Stelgidopteryx ruficollis)	S	R	U	U					U	O		O		O	
Barn Swallow (Hirundo rustica)	S	C	U	U					U	O	U	O		U	U
Cliff Swallow (Petrochelidon pyrrhonota)	S	C	U	U					U	U	U	U		O	
Purple Martin (Progne subis)	S	U	U	U			O	O	U	O		O	O		
Gray Jay (Perisoreus canadensis)	P	U			U	U	O	O	U	U		U	U		
Stellar's Jay (Cyanocitta stelleri)	P	C		U	U	U	U	U	U	U		U		U	
Scrub Jay (Aphelocoma coerulescens)	P	C		U	U	U			U	U	U	U	U		
Black-billed Magpie (Pica pica)	P	O		U	U	U				U		U			
Common Raven (Corvus corax)	P	U	U	U	U	U	O	O	U	U	U	U	U		
Common Crow (Corvus brachyrhynchos)	P	C	U	U	U	U	U	U	U	U	U	U	U		
Clark's Nutcracker (Nucifraga columbiana)	P	U			U	U	U	U					U		
Black-capped Chickadee (Parus atricapillus)	P	C		U	U	U	U	U	O	O		U	O		
Mountain Chickadee (Parus gambeli)	P	R			U	U	U	U	U	U		U	O		
Chestnut-backed Chickadee (Parus rufescens)	P	C			U	U	O	O	U	U		U	O		
Bushtit (Psaltriparus minimus)	P	C		U	U	U			U	U		U			
White-breasted Nuthatch (Sitta carolinensis)	P	U		U	U	U	U	U	U	U		U	O		
Red-breasted Nuthatch (Sitta canadensis)	P	U			U	U	O	O	U	U			O		
Brown Creeper (Certhia familiaris)	P	U				U	O	O	U	U			O		
Wrentit (Chamaea fasciata)	P	U		O	U					U		U			
Dipper (Cinclus mexicanus)	P	U							U	O		O			
House Wren (Troglodytes aedon)	S	U		U	U	U			U	U		U	O		
Winter Wren (Troglodytes troglodytes)	P	C		U	U	U	O	O	U	O		U			
Bewick's Wren (Thryomanes bewickii)	P	C			U	U	U	U	U	U		U	U		
Long-billed Marsh Wren (Cistothorus palustris)	P	U								O		O			

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			Habitat Use												
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Mockingbird (Mimus polyglottos)	P	O		U	U				U	U					
American Robin (Turdus migratorius)	P	C	U	U	U	U	U	U	U	U	U	U			
Varied Thrush (Ixoreus naevius)	P	C			U	U	O	O	U	U					
Hermit Thrush (Catharus guttata)	P	U			U	U	O	O	U	U		U			
Swainson's Thrush (Catharus ustulata)	S	C		U	U	U	U	U	U	O		U			
Western Bluebird (Sialia mexicana)	P	U	U	U					U		U		O		
Mountain Bluebird (Sialia currocoidea)	P	U	U	U							O		O	O	
Townsend's Solitaire (Myadestes townsendi)	P	U	U	U	U	U	U	U	U	U	U		U	U	
Golden-crowned Kinglet (Regulus satrapa)	P	C		U	U	U	O	O	U	U		U			
Ruby-crowned Kinglet (Regulus calendula)	P	U		U	U	U	O	O	U	U		U			
Water Pipit (Anthus spinoletta)	P	U								O		O			
Bohemian Waxwing (Bombycilla garrulus)	W	O		U	U	U	U		U	U		U			
Cedar Waxwing (Bombycilla cedrorum)	P	C		U	U	U	U		U	O		U			
Northern Shrike (Lanius excubitor)	W	R	U	U	U				U	U	U	U			
Loggerhead Shrike (Lanius ludovicianus)	S	R	U	U	U				U	U	U	U			
Starling (Sturnus vulgaris)	P	C	U	U						U	U	U	U	U	U
Hutton's Vireo (Vireo huttoni)	P	U		U	U	U	U	U	O	O		U			
Solitary Vireo (Vireo solitarius)	S	U			U	U	U	U	O	O	U	U			
Red-eyed Vireo (Vireo olivaceus)	S	R			U	U	U		O	O		U			
Warbling Vireo (Vireo gilvus)	S	C			U	U	U	U	O	O		U			
Orange-crowned Warbler (Vermivora celata)	S	C		U	U	U			U	U		U			
Nashville Warbler (Vermivora ruficapilla)	S	U		U	U	U			U	U		U			
Yellow Warbler (Dendroica petechia)	S	C		U	U	U	U	U	O	O		U			
Yellow-rumped Warbler (Dendroica coronata)	P	C		U	U	U	U	U	U	U		U			
Black-throated Gray Warbler (Dendroica nigrescens)	S	C		U	U	U	U	U	U	U		U			

Appendix E WILDLIFE SPECIES & HABITAT USE

			Habitat Use												
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Townsend's Warbler (Dendroica townsendi)	P	U				U	O	O	U	U		U			
Hermit Warbler (Dendroica occidentalis)	S	C				U	O	O	U	U		U			
MacGillivray's Warbler (Oporornis tolmiei)	S	C		U	U	U	U		U	U	U	U			
Yellowthroat (Geothlypis trichas)	S	C	U	U					U	O	U	O			
Yellow-breasted Chat (Icteria virens)	S	R		U	U	U			U	O		U			
Wilson's Warbler (Wilsonia pusilla)	S	C		U	U				U	O		O			
House Sparrow (Passer domesticus)	P	C													U
Western Meadowlark (Sturnella neglecta)	P	U	U	U							U	U			
Yellow-headed Blackbird (Xanthocephalus xanthocephalus)	S	R	U	U						O		O			
Red-winged Blackbird (Agelaius phoeniceus)	P	U	U	U					U	O		U			
Northern Oriole (Icterus galbula)	S	U	U	U					U	O		U			
Brewer's Blackbird (Euphagus cyanocephalus)	P	C	U	U	U				U	U	U	U			
Brown-headed Cowbird (Molothrus ater)	P	C	U	U	U	U			U	U	U	U			
Western Tanager (Piranga ludoviciana)	S	C			U	U	O	O	U	U		U			
Black-headed Grosbeak (Pheucticus melanocephalus)	S	C			U	U			U	O		U			
Lazuli Bunting (Passerina amoena)	S	U	U	U	U				U	U	U	U			
Evening Grosbeak (Hesperiphona vespertina)	P	C		U	U	U	O	O	U	U		U			
Purple Finch (Carpodacus purpureus)	P	C			U	U	U	U	U	U		U			
Cassin's Finch (Carpodacus cassinii)	P	R				U	U	U							
House Finch (Carpodacus mexicanus)	P	C		U	U	U			U	U		U			U
Pine Siskin (Carduelis pinus)	P	C	U	U	U	U	O	O	U	U		U			
American Goldfinch (Cardeulis tristis)	P	C	O	O	U	U			U	U	O	U			
Lesser Goldfinch (Carduelis psaltria)	P	U	O	U	U	U			U	U	O	U			
Red Crossbill (Loxia curvirostra)	P	U				U	O	O	U	U		U			
Green-tailed Towhee (Pipilo chlorura)	S	O		U	U				U	U		U			

Appendix E WILDLIFE SPECIES & HABITAT USE

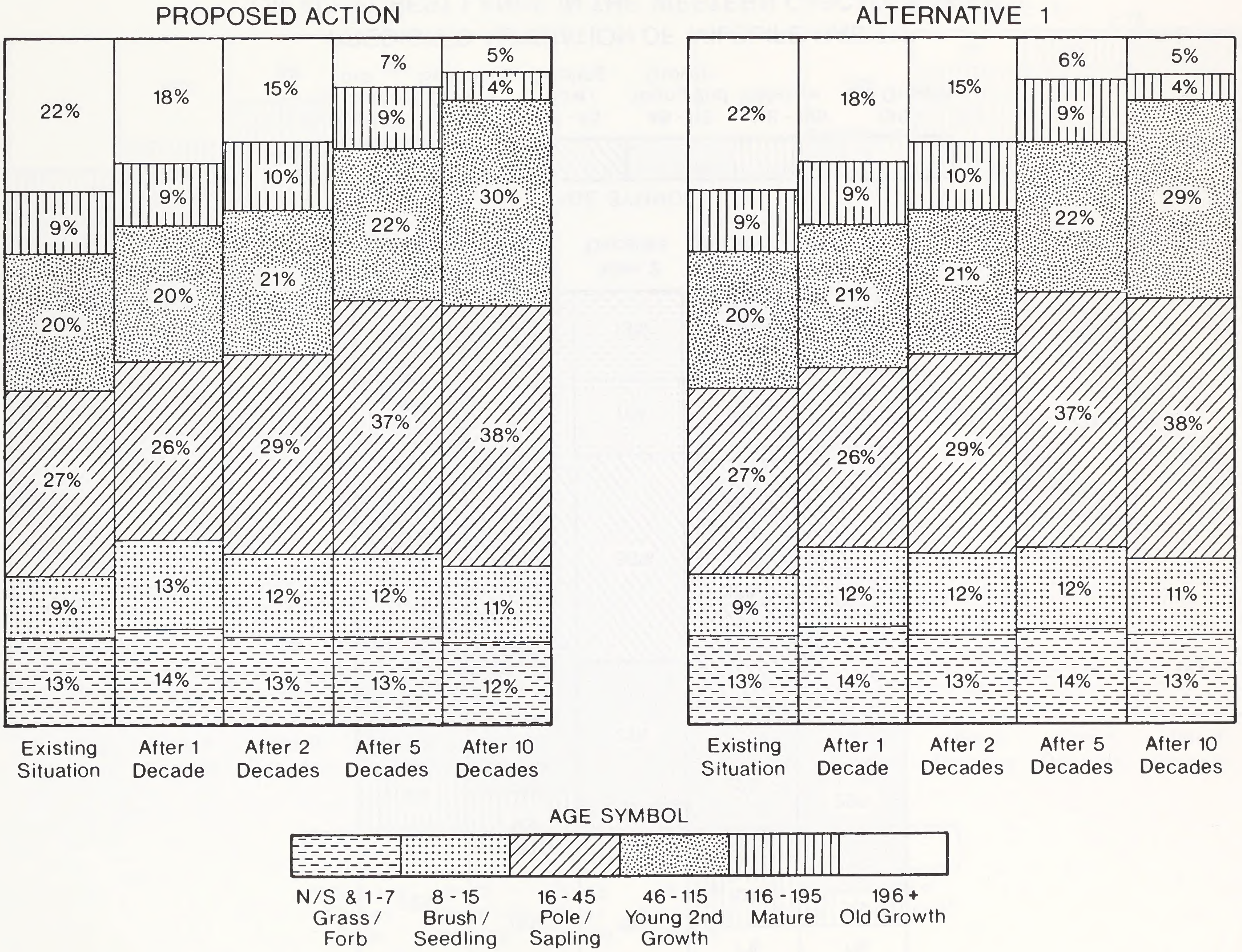
			Habitat Use												
			Conifer Habitat						Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Rufous-sided Towhee (Pipilo erythrophthalmus)	P	C		U	U	U			U	U	U	U			
Savannah Sparrow (Passerculus sandwichensis)	P	C	O	U							O				
Grasshopper Sparrow (Ammodramus savannarum)	S	O	O	U							O				
Vesper Sparrow (Pooecetes gramineus)	S	R	O	U							O				
Dark-eyed Junco (Junco hyemalis)	P	C	U	U	U	U	U	U	U	U	U	U		U	
Chipping Sparrow (Spizella passerina)	S	U	U	U	U	U			U	U	U	U			
Harris' Sparrow (Zonotrichia querula)	W	R	U	U	U					U	U	U			
White-crowned Sparrow (Zonotrichia leucophrys)	P	C	O	U	U					U	O	U			
Golden-crowned Sparrow (Zonotrichia atricapilla)	W	C	O	U	U				U	U	O	U			
White-throated Sparrow (Zonotrichia albicollis)	W	R	U	U	U					U	U	U			
Fox Sparrow (Passerella iliaca)	P	C		U	U	U			U	U	U	U			
Lincoln's Sparrow (Melospiza lincolnii)	P	C		U	U				U	O		O			
Song Sparrow (Melospiza melodia)	P	C	U	U	U				U	U	U	U			
Reptiles															
Western Pond Turtle (Clemmys marmorata)	P	C								O		O			
Painted Turtle (Chrysemys picta)	P	C								O		O			
Western Fence Lizard (Sceloporus occidentalis)	P	C	O	U					U	U	O			U	
Western Skink (Eumeces skiltonianus)	P	C	O	U					U	U	O			U	
Southern Alligator Lizard (Gerrhonotus multicarinatus)	P	C	O	U					U		U			U	
Northern Alligator Lizard (Gerrhonotus coeruleus)	P	C	O	U					U		O			U	
Rubber Boa (Charina bottae)	P	C	U	U	U	U	U	U	U	U	U	U			
Ringneck Snake (Diadophis punctatus)	P	R	O	U	U	U	U	U	O	U	O	U			
Western Yellow-bellied Racer (Coluber constrictor)	P	C	O	U	U	U			U	U	O	U			
Pacific Gopher Snake (Pituophis melanoleucus)	P	C	U	U	U	U	U	U	U	U	U	U		U	
Common Garter Snake (Thamnophis sirtalis)	P	C	U	U	U	U	U	U	U	O	U	O			

Appendix E WILDLIFE SPECIES & HABITAT USE

	Habitat Use														
	Conifer Habitat								Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Brush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwood	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes /Cliffs	Other
Western Terrestrial Garter Snake (Thamnophis elegans)	P	C	U	U	U	U	U	U	U	O	U	O			
Northwestern Garter Snake (Thamophis ordinoides)	P	C	U	U	U	U			U	U	U	U			
Western Rattlesnake (Crotalus viridis)	P	U	U	U	U	U			U		U			U	
Amphibians															
Northwestern Salamander (Ambystoma gracile)	P	C	U	U		U	U	U	U	O		O			
Long-toed Salamander (Ambystoma macrodactylum)	P	C	U	U		U	U	U	U	O		O			
Pacific Giant Salamander (Dicamptodon ensatus)	P	C				U	U	O	U	O		O			
Olympic Salamander (Rhyacotriton olympicus)	P	C					U	U	U	O		O		U	
Rough-skinned Newt (Taricha granulosa)	P	C	U	U	U	U	U	U	U	O		O			
Dunn's Salamander (Plethodon dunni)	P	C					U	U	U	O		O		U	
Western Red-backed Salamander (Plethodon vehiculum)	P	C		U	U	U	U	U	U	O		O		U	
Larch Mountain Salamander (Plethodon larselli)	P	U				U	U	U	U	O		O		O	
Oregon Salamander (Ensatina eschscholtzi)	P	C		U	U	U	U	U	U	O		O			
Oregon Slender Salamander (Batrachoseps wrighti)	P	U					O	O		O		O			
Clouded Salamander (Aneides ferreus)	P	C			U	U	O	O	U	O		O			
Tailed Frog (Ascaphus truei)	P	U	U	U	U	U	O	O		O		O			
Western Toad (Bufo boreas)	P	C	U	U	U	U	U	U	U	O		O			
Pacific Tree Frog (Hyla regilla)	P	C	U	U	U	U	U	U	U	O		O		U	
Red-legged Frog (Rana aurora)	P	C	U			U	U	U	U	O		O			
Western Spotted Frog (Rana pretiosa)	P	R	U	U	U	U				O		O			
Yellow-legged Frog (Rana boylei)	P	C	U			U	U	U	U	O		O			
Bullfrog (Rana catasbeiana)	P	C	U						U	O		O			

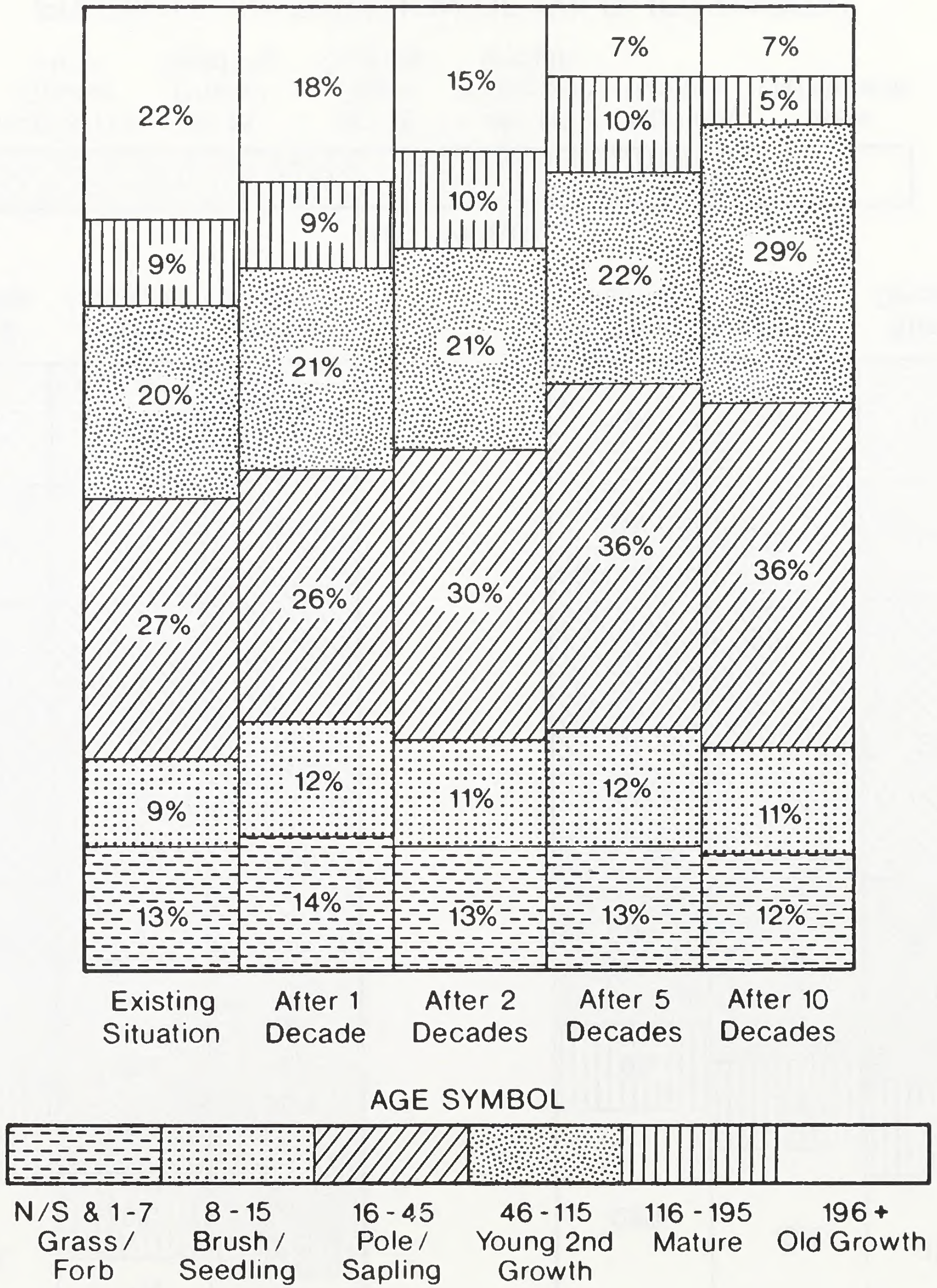
APPENDIX F

ALTERATION OF WILDLIFE HABITAT

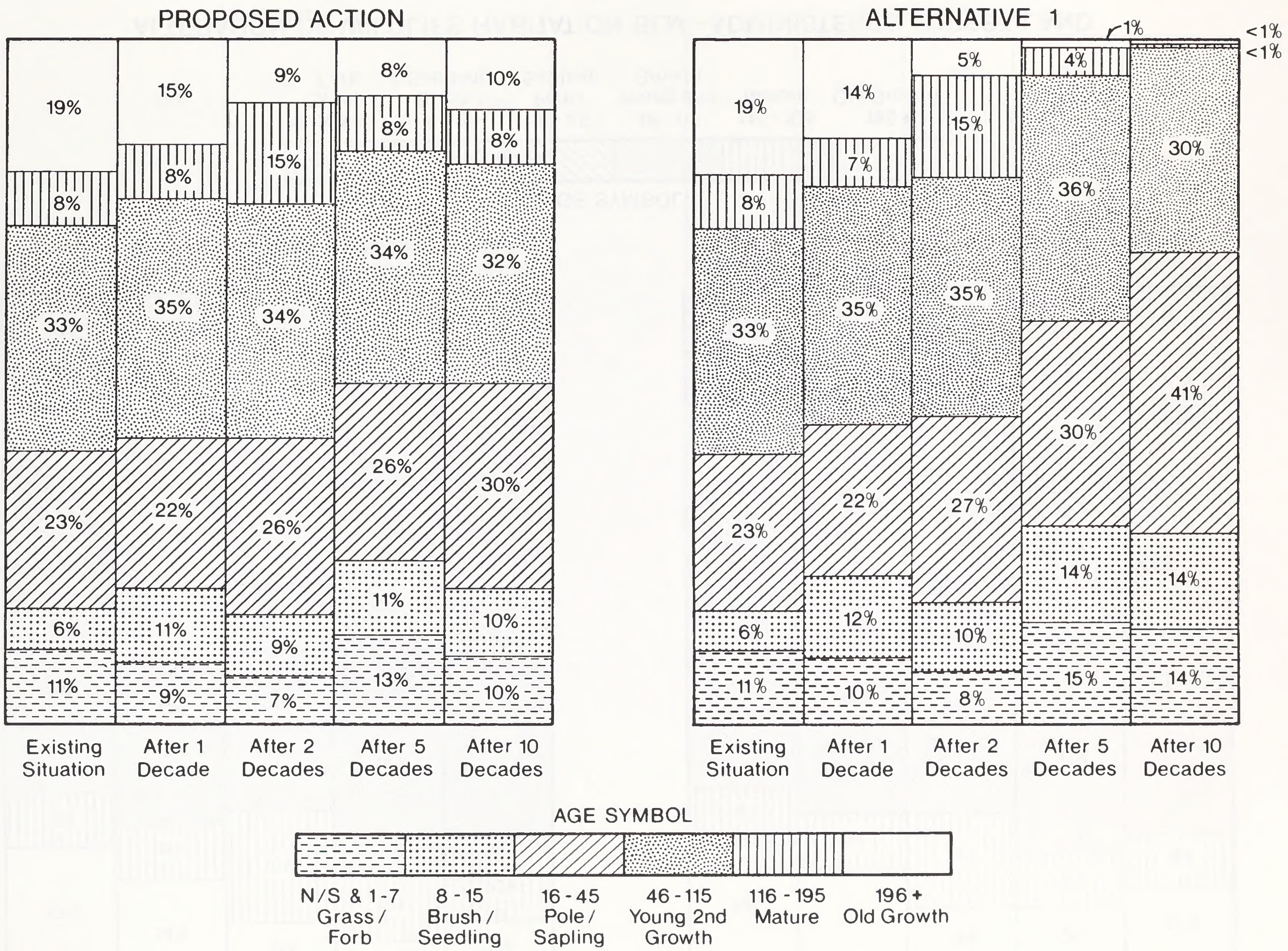


PREDICTED ALTERATION OF WILDLIFE HABITAT ON ALL FOREST LANDS IN THE WESTERN CASCADES AREA

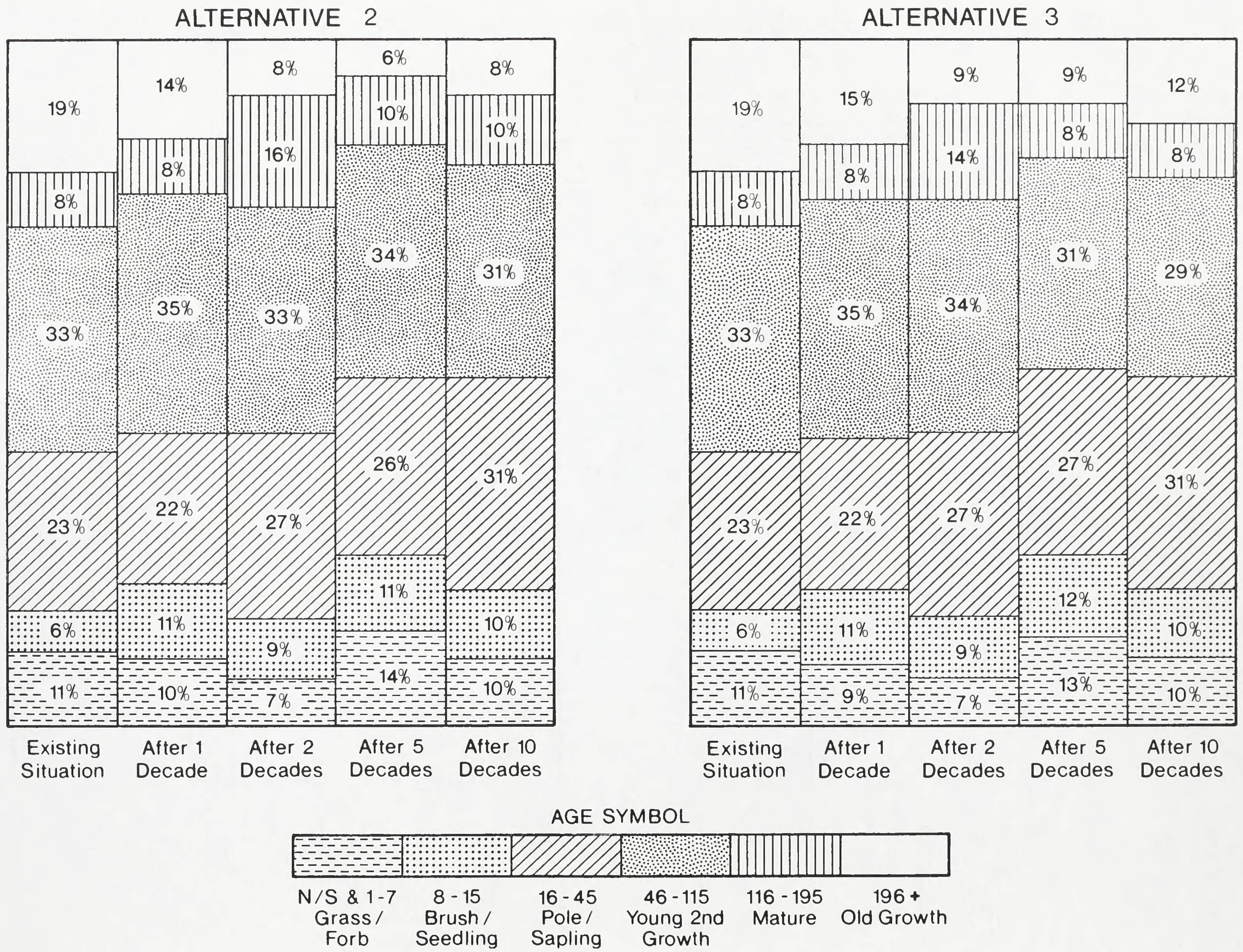
ALTERNATIVE 4



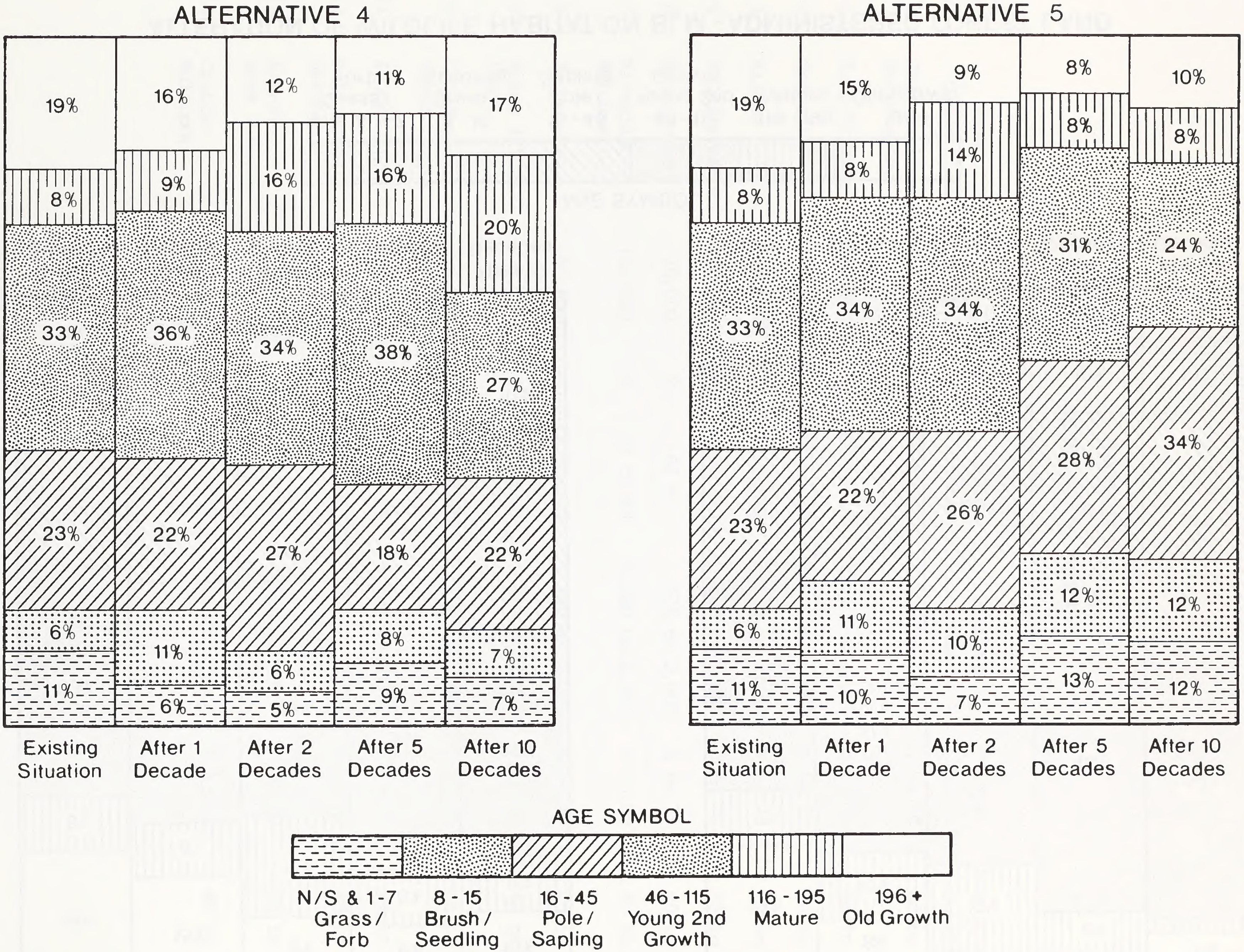
PREDICTED ALTERATION OF WILDLIFE HABITAT
ON ALL FOREST LANDS IN THE WESTERN CASCADES AREA



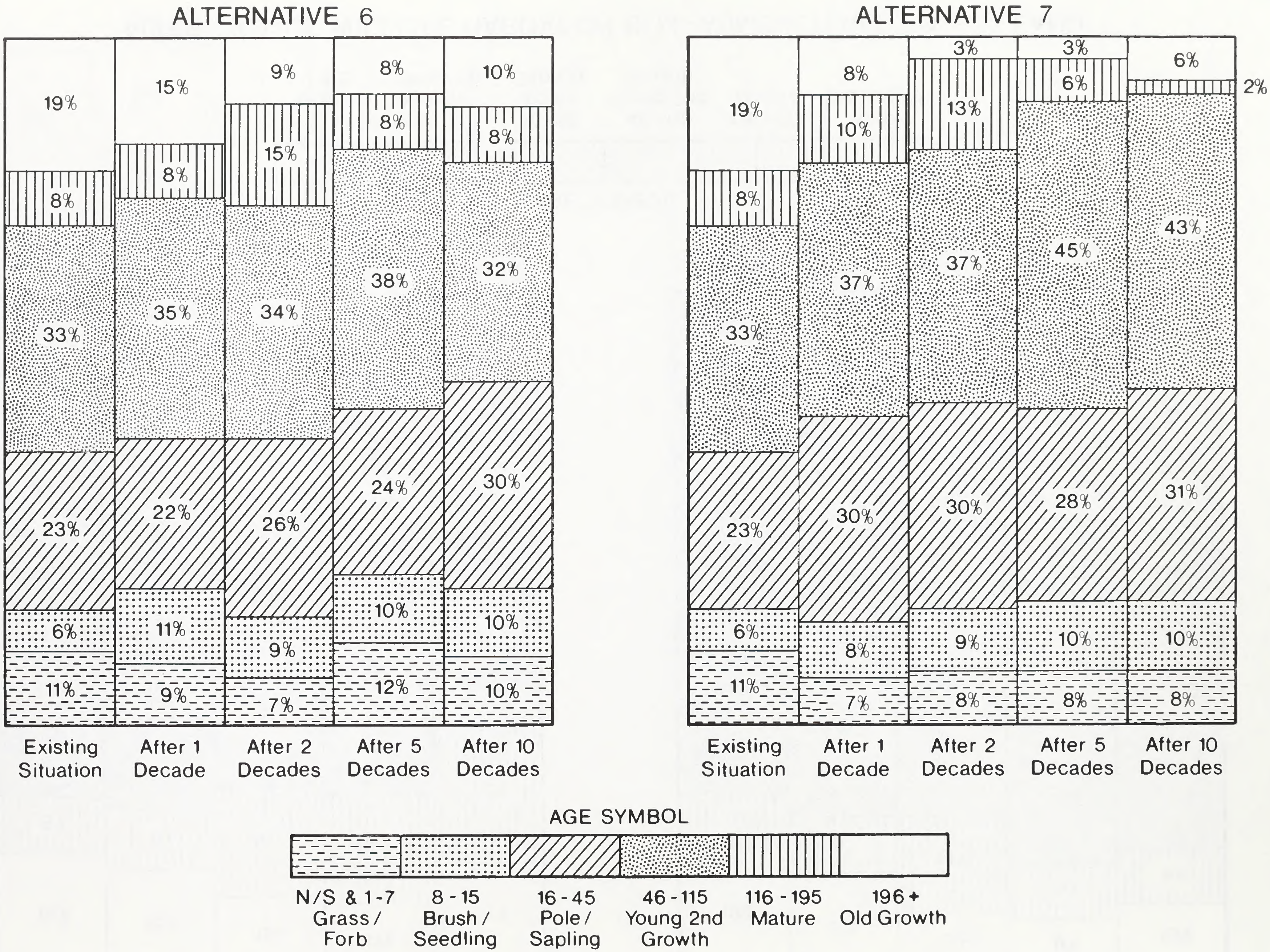
ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND



ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND



ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND



ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND

Appendix G

SOILS OF THE SYUs

Map Unit No.	Name of Association	Acres	Percent of BLM Area	Soil Depth (in.)	Elevation (ft.)	Slope (Percent)	Precipitation (in.)
1	Keel-Henline-Yellowstone	114,000	12	20 to 40	2,800 to 4,000	3 to 90	80 to 120
2	Keel-Cruiser	104,500	11	20 to 40	2,800 to 4,000+	3 to 75	80 to 120
3	Crabtree	19,000	2	40 to 60	2,800 to 4,000	2 to 75	80 to 120
4	Kinney	104,500	11	40 to 60	500 to 2,000	3 to 70	80 to 100
5	McCully-Astoria	228,000	24	40 to 60	800 to 2,000	2 to 70	55 to 80
6	Honeygrove	76,000	8	60 +	500 to 2,000	5 to 75	60 to 90
7	Klickitat-Kilches	133,000	14	20 to 40	1,500 to 2,800	3 to 90	80 to 120
8	Jory-Nekia	85,500	9	20 to 60	250 to 1,200	2 to 90	40 to 60
9	Mixed Alluvial land	9,500	1	0 to 60	100 to 2,000	0 to 10	40 to 85
10	Cozadero-Haphembrepts	38,000	4	40 to 60	600 to 900	0 to 20	60 to 85
11	Zygore	9,500	1	40 to 60	1,800 to 2,800	3 to 70	80 to 120
12	Bull Run-Mershan	9,500	1	40 to 60	500 to 2,000	3 to 70	60 to 80
13	Ashoff-Rock Outcrop	9,500	1	40 to 60	500 to 2,000	2 to 90	80 to 100
14	Crutch-Multopor	9,500	1	20 to 40	500 to 1,600	0 to 10	60 to 100

Appendix H SENSITIVE PLANT SPECIES CURRENTLY UNDER REVIEW FOR POSSIBLE LISTING

	Scientific Name	Common Name	Candidate For [1]	Observations[2]
*	Agoseris elata	Tall Agoseris		C
*	Agrostis howellii	Howell's Bentgrass		C
*	Arabis sparsiflora var. atrorubens	Sickle Pod Rock-cress		C
	Arnica viscosa	Shasta Arnica	E	C
*	Artemisia lindleyana	Lindley's Wormwood		B
	Aster curtus	White-Topped Aster	E	B
	Aster gormanii	Gorman's Aster	T	A
*	Aster hallii	Hall's Aster		B
	Aster vialis	Wayside Aster	E	B
*	Astragalus umbraticus	Woodland Milkvetch		C
*	Botrychium lanceolatum	Lance-Leaved Grape-fern		C
*	Botrychium virginianum	Virginia Grapefern		C
*	Calamagrostis howellii	Howell's Reedgrass		C
*	Carex macrochaeta	Alaska Long-Awned Sedge		B
	Castilleja levisecta	Golden Paintbrush	E	B
*	Cimicifuga laciniata	Mt. Hood Bugbane		B
	Corydalis aquae-gelidae	Cold-Water Corydalis	E	B
	Cypripedium californicum	California Lady's Slipper	T	C
*	Cypripedium fasciculatum	Clustered Lady's Slipper		C
	Cypripedium montanum	Mountain Lady's Slipper	T	B
	Darlingtonia californica	Pitcherplant	T	B
	Delphinium leucophaeum	White Rock Larkspur	E	B
	Delphinium pavonaceum	Peacock Larkspur	T	B
*	Draba aureola	Golden Alpine Draba		C
*	Dryopteris filix-mas	Male Fern		C
*	Elmera racemosa var. puberulenta	Cascade Elmera		C
*	Erigeron cascadensis	Cascade Daisy		B
	Erigeron decumbens var. decumbens	Meadow Erigeron	E	C
	Erigeron howellia	Howell's Erigeron	E	B

Appendix H SENSITIVE PLANT SPECIES CURRENTLY UNDER REVIEW FOR POSSIBLE LISTING

	Scientific Name	Common Name	Candidate For [1]	Observations [2]
*	Gentiana newberryi	Newberry's Gentian		C
*	Gentiana prostrata	Prostrate Gentian		C
	Howellia aquatilis	Howellia	E	B
	Hydrophyllum capitatum var. thompsonii	Ballheaded Waterleaf		C
*	Isoetes nuttallii	Nuttall's Quillwort		B
	Lathyrus holochlorus	Thin-Leaved Peavine	T	B
	Lomatium bradshawii	Bradshaw's Leptotaenia	E	B
*	Lupinus sulphureus var. kincaidii	Sulphur-Flowered Lupine		C
*	Lycopodium inundatum	Bog Clubmoss		B
*	Microcala quadrangularis	Timwort		B
*	Mimulus tricolor	Three-Colored Monkeyflower		B
	Phlox peckii	Peck's Phlox	T	C
*	Pityopus californica	Pine Foot		B
*	Polystichum californicum	California Sword-fern		C
*	Polystichum kruckebergii	Kruckeberg's Sword-fern		C
	Romanzoffia thompsonii	Thompson's Mist Maidens	E	B
	Rorippa columbiae	Columbia Cress	T	C
*	Sagittaria latifolia	Wapato		A, B
*	Salix brachycarpa	Short-Fruited Willow		C
*	Sarcodes sanguinea	Snowplant		A
	Sidalcea campestris	Meadow Sidalcea	T	B
	Sidalcea cusickii	Cusick's Checkermallow	E	B
	Sidalcea nelsoniana	Nelson's Sidalcea	E	B
	Sullivantia oregana	Oregon Sullivantia	T	B

[1] Threatened (T), Endangered (E), Undesignated to date (blank).

[2] Observed; on BLM - A, on other lands in the SYUs - B, Unobserved - C.

* Designated sensitive by Salem District Manager. All other species are designated as Bureau sensitive species by the Oregon State Director.

Appendix I PRIMARY CRITERIA FOR DETERMINING LEVELS OF CHANGE IN WILDLIFE HABITAT CONDITIONS DURING NEXT FIVE DECADES[1/]

Habitat Type	Existing Habitat Acres	Existing Habitat Condition	Changes in Acreage and Conditions by Alternative PA	1	2	3	4	5	6	7
Grass/Forb-Brush/Seedling										
Acreage	25,200		34,300	40,000	35,400	35,200	23,800	35,500	31,500	25,500
Habitat Composition		Poor	-	-	-	-	0	-	-	0
Habitat Distribution		Good	+	+	+	+	+	+	+	+
Habitat Integrity		Poor	-	--	-	-	+	-	-	--
Pole/Sapling - 2nd Growth										
Acreage	79,200		85,000	91,400	83,400	82,700	79,700	83,800	89,500	104,300
Habitat Composition		Good	-	-	-	-	0	-	-	--
Habitat Distribution		Good	+	+	+	+	+	+	+	+
Habitat Integrity		Poor	-	--	--	-	+	-	-	--
Mature										
Acreage	10,900		11,300	4,900	14,000	11,000	23,100	11,300	11,600	8,500
Habitat Composition		Good	+	--	+	+	++	+	+	-
Habitat Distribution		Poor	+	-	+	+	+	+	+	-
Habitat Integrity		Good	0	0	0	0	0	0	0	0
Old Growth										
Acreage	27,300		10,800	60	7,900	12,900	15,200	10,800	10,800	4,000
Habitat Composition		Good	-	--	--	-	-	-	-	--
Habitat Distribution		Poor	-	-	-	-	+	-	-	-
Habitat Integrity		Good	0	0	0	0	0	0	0	0
Hardwood										
Acreage	5,900		5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300
Habitat Composition		Poor	-	-	-	-	-	-	-	-
Habitat Distribution		Poor	0	0	0	0	0	0	0	0
Habitat Integrity		Good	0	0	0	0	0	0	0	0
Riparian										
Acreage	6,700		8,400	0	6,700	5,800	10,900	8,400	8,400	2,600
Habitat Composition		Poor	+	--	0	-	+	+	+	-
Habitat Distribution		Fair	+	--	0	-	+	+	+	--
Habitat Integrity		Poor	+	--	-	-	++	+	+	--
Habitat Diversity		Fair	0	-	-	0	+	0	0	-

+ = Beneficial - = Adverse 0 = None or Negligible

[1/] Predictions of forest composition in the fifth decade based upon allowable cut runs and Salem District inventory data.

Appendix J PRIMARY CRITERIA USED TO DETERMINE LEVEL OF TIMBER MANAGEMENT IMPACTS ON MAJOR RECREATION ACTIVITIES

I. Facility-Oriented

A. Camping/Picnicking Sites Subject to Timber Management

		Alternatives				
	PA,5,6	1	2	3	4	7
Existing Recreation Sites (9)	0	0	0	0	0	0
Existing Site Buffers (9)	3[1]	7	0	3[1]	0	0
Potential Recreation Sites (5)	3	5	0	3	0	0
Potential Site Buffers (5)	5[1]	5	0	5[1]	0	0

[1] Buffers are subject to some restricted timber harvest activities.

B. Hiking/Horse Riding Trails Subject to Timber Management

		Alternatives				
	PA,5,6[1]	1[2]	2[3]	3[1]	4	7[3]
Existing Trails (5)	4	5	4	4	0	4
Existing Trail Buffers (5)	4	5	4	4	0	4
Potential Trails (4)	3	4	3	3	0	3
Potential Trail Buffers (4)	3	4	3	3	0	3

[1] Buffer widths vary. Buffers and trail treads are subject to limited impact, e.g. road crossings.

[2] No buffers on existing trails, and treads subject to relocation as needed.

[3] Buffer widths on existing trails vary. Buffers and trail treads are subject to relocation and restricted entry for harvesting or road construction.

C. Special Sightseeing Locations Subject to Timber Management[1]

		Alternatives				
	PA,5,6	1	2	3	4	7
Sightseeing Locations (8)	1	7	1	1	0	1
Sightseeing Location Buffers (8)	1	8	2	1	0	2

[1] Does not include large, general sightseeing areas, since they will not be significantly impacted.

II. Non-Facility-Oriented

A. Hunting (big game)

Alternatives	Changes in Game Populations[1]
PA,5,6	Moderate increase in elk numbers.
1	Major decrease in elk numbers.
2	Slight decrease in elk numbers.
3	Moderate increase in elk numbers.
4	High increase in elk numbers.
7	Major decrease in elk numbers.

[1] Nominal changes in deer numbers are anticipated under the proposed action and other alternatives.

B. Fishing

Alternatives	Changes in Fish Populations
PA,5,6	Moderate increase in fish numbers.
1	Major decrease in fish numbers.
2	Negligible change in fish numbers.
3	Slight increase in fish numbers.
4	High increase in fish numbers.
7	Negligible change in fish numbers.

C. ORV Driving and Other[1]

Alternatives	Timber Management Impact Factor
PA,5,6	96 miles new road construction.
1	104 " " " "
2	97 " " " "
3	93 " " " "
4	86 " " " "
7	150 " " " "

[1] "Other" includes dispersed activities such as collecting, camping, picnicking, upland game hunting and general sightseeing.

Appendix K
PRIMARY CRITERIA USED TO DETERMINE PROBABLE CHANGES IN POTENTIAL ACECs

Potential ACECs	Alternative	Probable Activities	Major Consequences
Columbia River Gorge, Sandy River Gorge and Middle Santiam Terrace	1	Intensive timber management (ITM)[1] on all tracts.	Loss of sensitive plant species, scenic values.
	PA, 2-7	None	Protection of sensitive plant species, scenic values.
Williams Lake	1,7	ITM to lake's edge.	Loss of sensitive plant species.
	2	Road construction and salvage logging in buffer zone.	Alteration of water supply to lake. Damage to sensitive plant species.
	3,4	None.	Protection of sensitive plant species.
	PA, 5,6	ITM (10 percent removal per decade) in buffer zone.	Damage to portions of sensitive plant habitat.
Soosap Meadows	1	ITM throughout area.	Loss of sensitive plant species, scenic values.
	2	Road construction and salvage logging in buffer zone.	Modification of micro-habitat, possible damage to plant vitality (see Glossary), scenic values.
	3,4	None.	Protection of sensitive plant species, scenic values.
	PA, 5,6	ITM (10 percent removal per decade) in buffer zone.	Modification of natural vegetation within buffers, possible damage to sensitive plant habitat, scenic values.
	7	ITM up to meadow edge.	Modification of natural vegetation surrounding meadow, probable damage to sensitive plant habitat, scenic values.

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[1] Intensive timber management (ITM) includes road construction.

Appendix K
PRIMARY CRITERIA USED TO DETERMINE PROBABLE CHANGES IN POTENTIAL ACECs

Potential ACEC	Alternative	Probable Activities	Major Consequences
Table Rock	1	ITM[1] throughout area.	Loss of sensitive plant habitat, scenic and cultural values.
	PA,5,6	ITM (10 percent removal per decade) in buffer zone.	Potential change in plant species and/or species competition.
	2,7	ITM in buffer zone.	Modification of natural vegetation within buffer, possible damage to sensitive plant habitat, scenic values.
	3	ITM (5 percent removal per decade) in buffer zone.	Potential change in plant species and/or species competition.
	4	None.	Protection of sensitive plant habitat, scenic and cultural values.
Carolyn's Crown	1	ITM throughout area.	Loss of sensitive plant habitat and surrounding vegetation.
	PA, 2-6	None.	Protection of sensitive plant habitat.
	7	ITM throughout area except in riparian zones.	Loss of sensitive plant habitat, potential indirect damage to riparian zones.

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[1] Intensive timber management (ITM) includes road construction.

Appendix L

ANALYSIS OF ALTERNATIVE 5

Alternative 5 was designed to address two questions growing out of the Eastside Scoping process:

1. How would the Clackamas-Molalla SYU react to a deviation from the Bureau's non-declining even-flow policy? The supposition here is that there could be short-term and/or long-term increases in harvest.

2. To what extent could harvest from the Santiam SYU be increased by lowering the minimum harvest age below the 60-year age class included in the proposed action?

A comparison between Alternative 5 and the proposed action discloses several trade-offs between short-term use and long-term productivity. Due to differences between the two SYUs, trade-offs for each will be discussed separately.

Clackamas-Molalla SYU

Under Alternative 5, harvest over the short term (first 10 years) would be 61 MM bd. ft. (6.1 MM bd. ft./year) above that of the proposed action (see Figure L-1). For the following two decades the harvest would be reduced to 39.3 MM bd. ft. annually (1.0 MM bd. ft./year below that of the proposed action).

Beginning with the fourth decade, harvest would equal that of the proposed action (40.3 MM bd. ft./year).

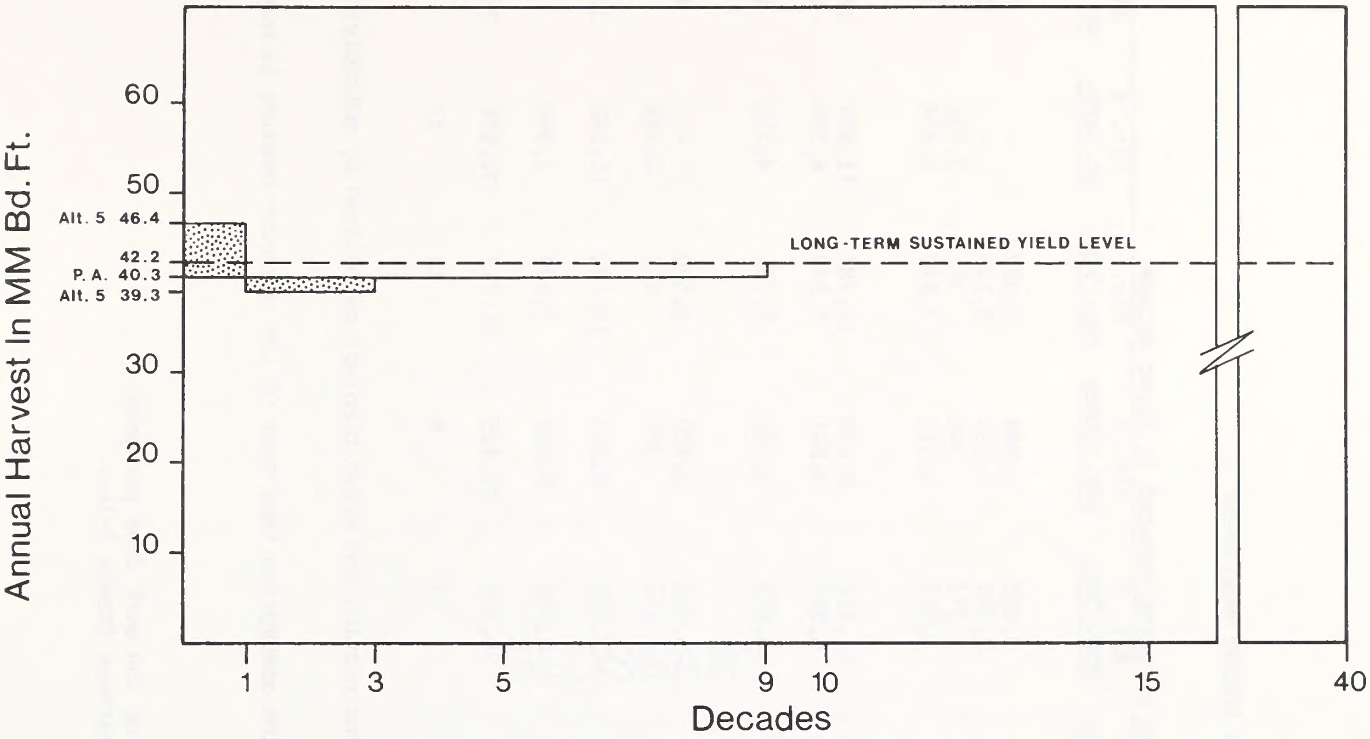
Maximum long-term productivity is expected to be reached in the ninth decade. At that point the forest would be considered regulated, and the maximum annual sustainable harvest would be 42.2 MM bd. ft. The first decade harvest under Alternative 5 would exceed this maximum sustainable harvest by 4.2 MM bd. ft. annually. Although exceeding the maximum sustainable harvest would violate current BLM policy, it would not affect the time required to achieve forest regulation, nor would it reduce the minimum harvest age below 60 years. By the time the forest is regulated under either alternative (nine decades), Alternative 5 would produce a total of 41 MM bd. ft. more than the proposed action.

It is apparent from this analysis that the long-term productivity of the SYU would not be affected by moderate fluctuations in harvest. This can be attributed primarily to two factors: First, the initial age class distribution contains acres in most age classes from non-stocked to 200 years with approximately 40 percent of the SYU between 100 and 200 years of age. This distribution would assure a continuous flow of harvestable age timber over the entire 40-decade projection period. Secondly, the minimum age for final harvest is 60 years. This is a favorable situation, as it is only slightly younger than the age at which maximum annual sustainable harvest is reached (75 years).

Santiam SYU

Under Alternative 5, harvest over the short term would be 21 MM bd. ft. (2.1 MM bd. ft./year) above that of the proposed action. However, long-term productivity would be sacrificed. Maximum growth (occurring at first regulation) would be an estimated 64.1 MM bd. ft. annually. As illustrated in Figure L-1, Alternative 5 would produce a total of 294 MM bd. ft. more than the proposed action until the 14th decade when the proposed action would achieve regulation. During the 14th through 40th decades, the proposed action would produce a total of 2,964 MM bd. ft. more than Alternative 5, which would achieve regulation around the 40th decade. Therefore, over the long term (40-decade projection period), the proposed action would produce 2,670 MM bd. ft. more than Alternative 5. The lengthy period of time required to achieve regulation under Alternative 5 can be attributed to two factors: First, the SYU contains large acreages in the 0-40 and 200+ age classes but is deficient in the middle age classes. The full impact of this situation would occur in the sixth decade when young stands (40 and 50 years) would begin to be scheduled for final harvest to bridge the supply gap. Secondly, the higher harvest level, a result of lowering the minimum final harvest age from 60 years in the proposed action to 50 years, would drive the harvest down into stands much younger than the age at which maximum annual sustainable harvest is reached (80 years). Harvesting in these younger, lower-volume stands would start early in the projection period (sixth decade). As a result, large final harvest acreages would be generated early. The remainder of the 40-decade period would be required for the SYU stand to grow back to the point where final harvest would occur at or near the age of maximum growth.

ALTERNATIVE 5 vs PROPOSED ACTION - Clackamas-Molalla SYU



ALTERNATIVE 5 vs PROPOSED ACTION - Santiam SYU

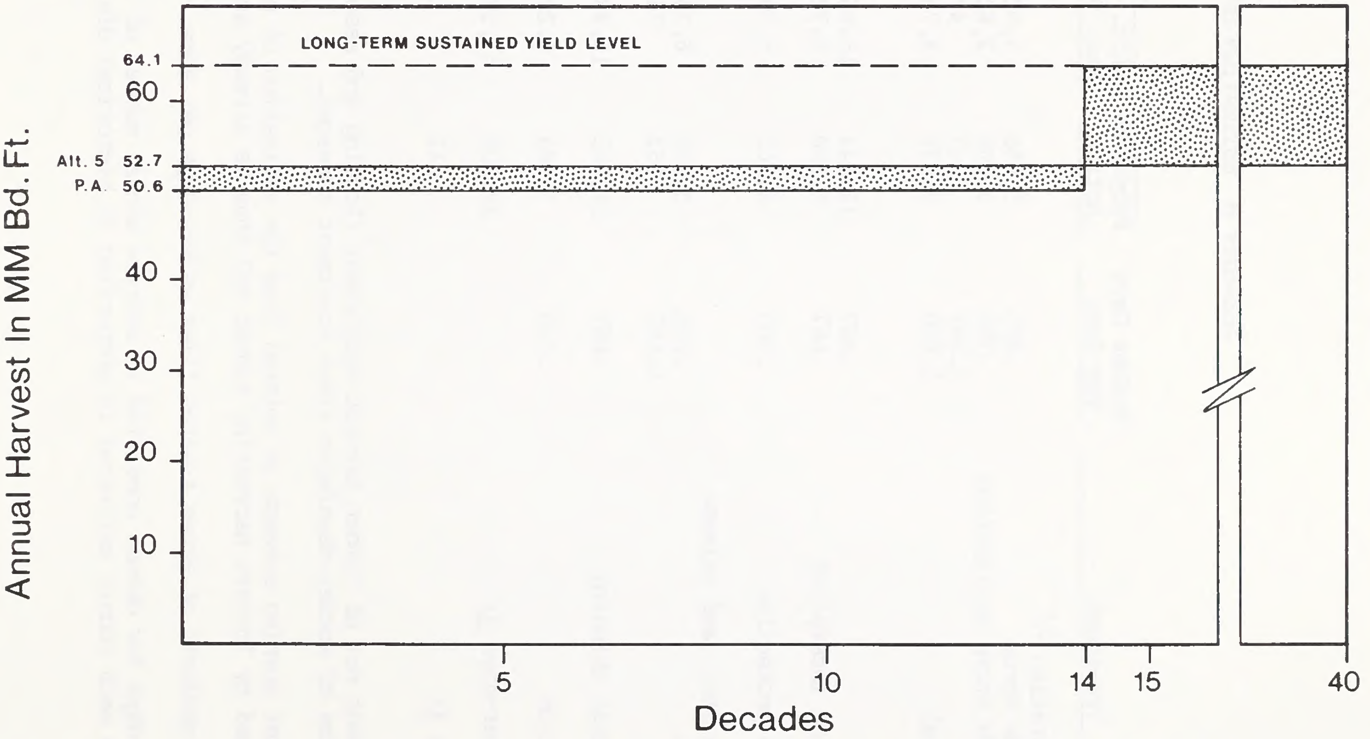


FIGURE L-1

ANALYSIS OF ALTERNATIVE 5

Appendix M ESTIMATION OF EMPLOYMENT IN FOREST MANAGEMENT 1/

		Number of acres treated in first decade							
Treatment	Worker Days Per Acre	Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Emp. Tbr.	Alt. 3 Mod. Tbr.	Alt. 4 Emp. Other	Alt. 5 Acc. Tbr.	Alt. 6 No Herb.	Alt. 7 No Action
Site preparation 2/									
Herbicide spray	.025	3,050	4,006	3,160	3,015	1,948	3,323	-	1,968
Herbicide stump application	.750	2,000	2,658	2,074	2,007	1,332	2,188	-	1,969
Manual	1.667	367	471	399	373	205	391	2,041	234
Mechanical	1.000	3,578	4,760	3,765	3,662	2,513	3,910	3,454	3,237
Planting:									
Initial	.667	12,544	15,860	13,124	12,716	8,438	13,782	11,997	11,918
Replant or interplant	.667	6,900	8,723	7,218	6,994	4,641	7,580	6,598	6,555
Plantation protection	.500	4,362	5,799	4,602	4,402	2,825	4,761	4,212	1,864
Plantation mtnc. and release									
Chemical	.025	5,000	6,750	5,200	5,100	3,450	5,500	-	4,900
Manual	1.667	553	749	581	567	385	609	2,199	546
Precommercial thinning	.667	11,162	13,498	11,623	12,599	8,243	11,162	11,162	13,079
Fertilization	.025	7,984	9,282	8,064	8,702	6,418	7,984	7,984	-
Total worker-days 3/		29,608	37,588	30,986	30,906	20,425	31,712	32,676	28,163
Total jobs 4/		12	15	12	12	8	13	13	11

1/ Employment net of timber harvest employment (logging and associated road construction and slash burning) calculated by multiplying estimates of worker-days/acre times treatment acreages.

2/ Broadcast burning acreage is omitted from the estimation of employment on the assumption that most of the clearcut burning is now performed by loggers harvesting timber and thus is already accounted for.

3/ Sum of products of acres treated times worker-days per acre.

4/ Worker-days for decade converted to average annual number of jobs on basis of 250 work days per year. Jobs in each county estimated in proportion to historical distribution of harvest (Table 2-16).

GLOSSARY

GLOSSARY OF TERMS

Acre-foot - The volume of water that will cover 1 acre to a depth of 1 foot.

Active Channel - That portion of a stream channel that conveys the usual range of streamflow. Active channel is a geomorphic expression of recent discharges and is altered and shifted regularly during the normal fluctuation of streamflow.

Allowable Cut - The amount of timber that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

Allowable Cut Effect (ACE) - The immediate increase in today's allowable cut which is justified by expected future increases in yields due to present or proposed management treatments.

Allowable Cut Determination Process - The development and evaluation of alternative levels of timber production for the purpose of establishing an allowable cut.

Anadromous Fish - Fish which migrate from the sea to breed in fresh water. Their offspring return to the sea.

Archeological Resources - All evidences of past human occupations other than historical documents, which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental data and all other relevant information. Archeological resources are also called cultural resources.

Area of Critical Environmental Concern (ACEC) - An area within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards (FLPMA Sec. 103(a)).

Aspect - The direction a slope faces.

Average Employment - The sum of number of employees, reported monthly, divided by twelve; because employment is reported for all employees working during any one month, it is a modest over-estimate of full-time equivalent employment.

Basal Area - The area of the cross-section of a tree stem near its base, generally at breast height and inclusive of bark. It is usually expressed as square feet per acre.

Biomass - The amount of living matter in a given area.

Biome - The largest land community unit (plant and animal) which is convenient to recognize.

Board Foot - A unit of solid wood, 1 foot square and 1 inch thick.

Breeding Unit - A basic physiographic unit within which seed is collected from selected trees for use in breeding programs to increase genetic gains in growth and quality.

British Thermal Unit (BTU) - A unit of heat equal to 252 calories; quantity of heat needed to raise the temperature of one pound of water from 62° F. to 63° F.

Broadcast Burning - Intentional burning in which fire is intended to spread over all of a specific area. It may or may not qualify as prescribed burning.

Bucking - Cutting trees into log lengths.

Buffer Strip - A protective area adjacent to an area requiring special attention or protection. In contrast to riparian zones which are ecological units, buffer strips can be designed to meet varying management concerns.

Bureau Planning System - A process used in the BLM to establish land use allocations, constraints and objectives for various categories of public land use.

Carcinogenic - A substance producing or inciting cancer.

Characteristic Landscape - The visual characteristics of existing landscape features (including man-made) within an area. The term does not necessarily mean naturalistic landscape character. It can refer to farmlands, timberlands or other types of landscapes.

Clearcutting - A method of timber harvesting in which all trees (merchantable or unmerchantable) are cut from an area.

Commercial Forest Land - Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species.

Commercial Thinning - Intermediate cutting made in merchantable stands (30-70 years old) in order to stimulate the growth of remaining trees and increase total yield from the stand.

Community Income Effect - The sum of direct and indirect personal income generated by a change, e.g., timber harvest. Indirect personal income results from economic activity stimulated in other local enterprises by purchase of goods and services, primarily of a support nature.

Constrained Timber Production Base - Base acreage managed for timber production at a lesser intensity in consideration for other resource management objectives, e.g., minimum harvest age of 350 years for wildlife habitat (see Intensive Timber Production Base).

Critical Habitat - (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Endangered Species Act, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) which may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by the species at the time it is listed upon the determination by the Secretary that such areas are essential for the conservation of the species.

Cull - A tree or log which is rejected because it does not meet minimum merchantability specifications.

Cultural Resources - Those fragile and nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features, that were of importance in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred--even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource. Cultural resources, including both prehistoric and historic remains, represent a part of the continuum of events from the earliest evidences of man to the present day.

Debris Avalanches - Rapid, shallow soil movements from steep hill-slopes.

Debris Torrent - A very fluid mass of soil, rock and vegetative debris that moves rapidly down steep, narrow stream channels.

Discharge - Rate of flow of a fluid, the volume of fluid passing a point per unit of time, commonly expressed as cubic feet per second (cfs), million gallons per day, gallons per minute, or cubic meters per second.

Dispersed Recreation - Pleasure-seeking activities which may occur over wide areas. Density of use is normally low and facility developments are non-existent.

Distance Zone - One of three subdivisions of a viewed area based upon the distance separating observer and observed area. The three distance zones and criteria are: (1) foreground/middle ground (primary zone)-that portion of an area being viewed which encompasses everything seen from the viewing location to a distance not exceeding 5 miles, (2) background (secondary zone)-that portion of an area being viewed which encompasses everything seen beyond the primary zone to a distance not exceeding 15 miles; and (3) seldom seen (tertiary zone)-portions of an area not seen from the viewing location to a distance not exceeding 15 miles, or areas seen beyond the 15-mile limit.

Droughty - A soil that, due to its internal characteristics, provides limited plant food and moisture.

Dry Ravelling - The downslope movement of detached soil, debris or gravel.

Ecosystem - An ecological unit consisting of both living and nonliving components which interact to produce a natural, stable system.

Educational and Scientific Study Area - Lands designated by the Salem District Office for outdoor education, research, observation and similar activities.

Environmental Assessment (EA) - A systematic environmental analysis of site-specific BLM activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required.

Environmental Impact Statement (EIS) - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major Federal action.

Erosion (soil) - Removal of soil from its place of origin to a point of deposition other than a stream channel.

Escape Cover - Generally, any vegetation, rocks or logs used by fish for security or escape from danger.

Evapotranspiration - The process which returns soil moisture to the atmosphere including evaporation and plant transpiration (uptake of soil water through roots and loss of water through leaves or needles).

Even Flow - Maintaining a relatively constant, undiminishing supply of timber from year to year for the planning cycle.

Extensive Inventory - An inventory based upon random sample plots. The forest base is separated into small groups with similar characteristics (volume, stems per acre, basal area, etc.). The total number of plots required per group is determined by stand variability and the sampling precision desired.

Fauna - All the animals in a given area.

Final Harvest Cut - Constitutes removal of a mature stand, either through clearcutting or cutting the final stage of a shelterwood regime.

Flora - All the plants in a given area.

Foliage Profile - The relationship between foliage density and height.

Forbs - Herbaceous plants; most often used pertaining to herbaceous plants eaten by wildlife.

Forest Canopy - The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

Forest Land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use.

Forest Management Program - Includes timber activity plan and all forest resource-related program activity plans.

Forest Type Island - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement and condition to be distinguishable from vegetation on adjoining areas.

Gene Pool - Composite of all genetic combinations present in a plant or animal population at a given time.

Gross Yarding - Removal from a logging unit of most large tree materials (generally all logs greater than 8 inches in diameter and at least 8 feet in length).

Growing Stock - The amount of standing, green timber retained to produce forest products; also known as forest capital.

Habitat - The environment in which an organism occurs.

Hiding Cover - Vegetation capable of hiding 90 percent of a standing adult deer or elk from the view of a human at a distance equal to or less than 61 meters (200 ft.). Generally, any vegetation used by deer or elk for security or escape from danger.

High-lead Logging - A yarding system in which logs are pulled to a landing by a cable which passes through a block hung in a tree or portable tower.

Historic Resources - All evidences of human activity that date from historic (i.e., recorded history) periods. These resources include documentary data (i.e., written records, archival material, photographs, maps, etc.), sites, artifacts, environmental data, and all other relevant information. Also included are locations where documented historical events took place, even though no physical evidence of the events remain other than the setting. Historic resources are cultural resources and may be considered archeological resources when archeological work is involved in their identification and interpretation.

Instream Structure - Boulders and large stable woody debris which create pools and trap spawning gravel. Extensively used by fish for security or escape from danger.

Intensive Forest Management Lands - All commercial forest land that is part of the timber production base for allowable cut calculation.

Intensive Timber Production Base - Base acreage intensively managed for timber production. These acres receive the greatest amount of intensive management treatment, thus producing the greatest timber yields.

Intermediate Cuttings - Any removal of merchantable trees from a stand prior to the final harvest cutting, i.e., commercial thinning, sanitation/salvage, or shelterwood regeneration cuttings.

Landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

Leach - Usually refers to the movement of chemicals through soil by water; may also refer to movement of herbicides out of leaves, stems or roots into the air or soil.

Log Flows - Destinations of harvested timber by origin. Origins used herein are management units and counties or county groupings; destinations are communities, counties or groupings of counties within which the primary processing of timber takes place.

Lumber and Wood Products, except Furniture - Defined by the Office of Management and Budget and the Standard Industrial Classification Manual as Major Group #24, which includes logging contractors engaged in cutting timber and pulpwoods; merchant sawmills, lath mills, shingle mills, planing mills, plywood mills, and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are classified in Major Group #25.

Management Framework Plan (MFP) - Land use plan for public lands which provides a set of goals, objectives and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

Mass Movement - Downslope movement of soil and rock caused by gravity; may be slow (creep) or rapid (landslide, debris avalanche).

Microclimate - The climatic condition of a small area modified from the general climatic conditions by local differences in elevation or exposure.

Minimum Harvest Age - The lowest age of a stand to be scheduled for final harvest.

Mortality Salvage - See sanitation/salvage cutting.

Multiple Use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

Mutagen - A substance that tends to increase the frequency or extent of genetic mutations.

Mutagenesis Assay - Test to determine the extent to which a substance may cause genetic mutations (changes in hereditary material).

National Register of Historic Places - The official list, established by the Historic Preservation Act of 1966, of the nation's cultural resources worthy of preservation. The Register lists archeological, historic, and architectural properties (i.e., districts, sites, buildings, structures, and objects) nominated for their local, State, or national significance by State and/or Federal agencies and approved by the National Register staff. The Register is maintained by the National Park Service.

Natural Levels - Amount of pollutants present from natural sources without human disturbances, which have reached equilibrium.

Non-commercial Forest Land - Land which is not capable of yielding at least 20 cubic feet of wood per acre per year from commercial species, or land which is capable of producing only non-commercial tree species.

Non-forest Land - Land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

Non-point Source Pollution - Water quality problems caused by the introduction of materials from diffuse sources (e.g., sediment, nutrients), or from a natural or manmade alteration in the stream system.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

Off-Road Vehicle (ORV) - Any motorized vehicle (except boats) designed for or capable of cross-country travel.

Old-growth Related - An animal or plant species that finds optimum habitat in old-growth forests.

Operations Inventory - An intensive forest inventory which provides such information as the location, acreage, volume and silvicultural needs, for each parcel of BLM-administered land.

Outstanding Natural Areas - Areas of outstanding scenic splendor, natural wonder or scientific importance that merit preservation in their natural condition. The preservation of these resources in their natural condition is the primary management objective. Access roads, parking areas and public use facilities are normally located on the fringe of the area. The public is encouraged to walk, rather than drive, into the area for recreation purposes wherever feasible.

Paleontology - A science dealing with the life of past geological periods as known from fossil remains.

Parent Material - The unconsolidated, chemically weathered mineral or organic matter from which soils develop.

Partial Cutting - Tree removal other than by clearcutting (see Intermediate Cuttings).

Particulates - Finely divided solid or liquid particles in the air or in an emission; includes dust, smoke fumes, mist, spray and fog.

Peak Flow - The highest amount of streamflow or riverflow occurring in a year or during a single storm event.

Personal Income - Income received by all individuals in the economy from all sources; made up of wage and salary disbursements, proprietors income, rental income of persons, dividends, personal interest income, and the difference between transfer payments and personal contributions for social insurance.

Plant Community - An association of plants of various species found growing together in different areas with similar site characteristics.

Plant Vitality - The healthy life cycle of a plant community.

Plantation Maintenance - Any vegetation management action taken on an unestablished stand to promote the survival and establishment of suitable trees. Treatments may include use of biological, mechanical, or manual weeding, mulching, herbicides or a combination of methods.

Precommercial Thinning - Cuttings made in immature stands (10-25 years) in order to stimulate the growth of trees by increasing available soil moisture and nutrients. Such cuttings decrease the time needed to reach merchantable size and increase total merchantable yields from the stand.

Prehistoric - Pertaining to that period of time before written history.

Primary Excavator - An animal that digs or chips out cavities in wood to provide itself or its mate with a site for nesting or roosting.

Progeny Site - A test area for evaluating parent seed trees by comparing the performance of their offspring seedlings.

Public Lands - Any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management. May include public domain, O&C or acquired lands in any combination.

Public Domain Lands - Original holdings of the United States never granted or conveyed to other jurisdictions.

Recreation Experience - The expected or desired psychological and physiological outcomes from engaging in a specific recreation activity within a specific setting.

Recreation Lands - A tract of land usually several thousand acres in size where recreation is or is expected to be a major use, and designation will assist the public by making the area known to them (CFR 43, Part 2070).

Recreation Site - A recreational development on a relatively small, distinctively defined parcel of BLM-administered land. Sites have facilities (e.g., roads, parking space, litter cans, tables, restrooms, waste water sumps, barbeque pits) designed primarily to accommodate camping and/or picnicking.

Reforestation - Reestablishment of a tree crop on forest land.

Regeneration - The renewal of a commercial tree crop, whether by natural or artificial means; also, the young crop itself.

Regeneration Cut - The first entry of a two-stage shelterwood harvest method in which 30 to 60 percent of the original stand basal area is removed.

Regeneration Period - The time it takes for a new commercial timber stand to become stocked following the date of a timber sale.

Regulated Forest - A forest comprised of a desired (usually even) distribution of age classes or tree sizes in which growth and harvest are in equilibrium (at the highest level sustainable) and the level of growing stock remains relatively constant.

Release - Any action taken on an established commercial timber stand to control stand composition and promote dominance and/or growth of suitable tree species. Treatments may include mechanical or manual slashing of undesirable brush and tree species, herbicides, biological control or a combination of methods. Forest fertilization is not considered a release treatment.

Relict - A remnant or fragment of a flora that remains from a former period when it was more widely distributed.

Research Natural Areas - Areas established and maintained for research and education. The general public may be excluded or restricted where necessary to protect studies or preserve research natural areas. Lands may have: (1) Typical or unusual faunistic or floristic types, associations, or other biotic phenomena, or (2) characteristic or outstanding geologic, pedologic or aquatic features or processes.

Riparian Habitat (Area or Zone) - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics.

Runoff - That part of precipitation, as well as any other flow contributions, which appears in surface streams, either perennial or intermittent.

Sanitation/Salvage Cutting - Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees expected to die prior to final harvest cut. This removal will recover merchantable volume which would otherwise be lost to decay.

Sawlog - A log considered suitable in size and quality for producing sawn timber.

Scenic Quality - A measure (high, moderate, low) of the aesthetic appeal of an area. Scenic quality is determined by an interdisciplinary team of evaluators using standard Bureau criteria (BLM Manual 8400).

Scribner - A log rule commonly accepted in the EIS area used to determine the board foot volume contained in a log.

Secondary Succession - An alteration of the natural plant succession of an area by fire, cultivation, logging, windthrow or any similar disturbance that destroys the principal species of an established community.

Sediment - Organic matter or soil that settles to the bottom of a liquid.

Sediment Yield - The quantity of sediment, measured in dry weight or by volume, transported in water flowing through a stream cross-section in a given time. Consists of both suspended sediment and bedload.

Sensitive Species - Species not yet officially listed but which are undergoing a status review or are proposed for listing according to Federal Register notices published by the Secretary of the Interior or Secretary of Commerce, or according to comparable State documents published by State officials. (Reference Instruction Memo W.O. 80-722).

Sensitivity Level(s) - A measure (high, medium, low) of the amount of use an area receives and of public attitudes about the visual resources of the area. Sensitivity levels are based upon standard Bureau criteria (BLM Manual 8400).

Seral (Successional) Stage - The relatively transitory plant communities within an orderly process of plant community change.

Shelterwood Cutting - A series of cuttings designed to establish a new crop of trees under the protection of the old.

Silviculture - The art of producing and tending a forest.

Site Class - A measure of an area's relative capacity for producing timber or other vegetation.

Site Preparation - Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment which is favorable for survival of suitable trees during the first growing season. This environment can be created by altering ground cover, soil or microsite conditions; using biological, mechanical, or manual clearing; prescribed burning; herbicides or a combination of methods.

Slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

Slump-earth flow - A slump is a rotational movement of a block of earth over a broadly concave slip surface that involves little breakup of material. An earth flow occurs when material breaks up and flows downslope.

Snag - A standing dead tree or partially dead tree from which some or all of the leaves and limbs have fallen. For management purposes, a snag is defined as any dead or partly dead tree at least 10.2 cm. (4 in.) dbh and at least 1.8 m. (6 ft.) tall.

Soil - The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

Soil Mapping Unit - A combination of soils or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes of a survey; the basis for the delineations of a soil survey map.

Soil Productivity - The capacity of a soil in its normal environment to produce a specified plant or sequence of plants under a specified system of management.

Standard Industrial Classification (SIC) - An industrial classification system as defined by the Office of Management and Budget; defines industries in accordance with the composition and structure of the economy and covers the entire field of economic activity. Refer to lumber and wood products for an explanation of SIC 24.

State Historic Preservation Officer (SHPO) - The official within each State, authorized by the State at the request of the Secretary of the Interior, to act as a liaison for purposes of implementing the National Historic Preservation Act of 1966.

Stocking Surveys - Examination of planting site either prior to first planting or following treatment. Survey is designed to identify any conditions which may limit the success of a reforestation project so corrective action can be taken.

Stream Order - A system of stream classification. Each small unbranched tributary is a first order stream. Two first order streams join to make a second order stream. A third order stream has only first and second order tributaries, and so forth.

Sub-biome - A subdivision of a biome (plant and animal community) containing distinctive species.

Succession - The orderly process of plant community change. Process by which one plant community will succeed another over time given the same climatic conditions.

Survival Cover - Cover required by animals to mitigate effects of a period of severe weather that cannot be met by thermal cover. The objective of retaining survival cover is to provide a forest stand structure which will intercept snow during severe storms and provide significant quantities of forage in the same stand. Stand closure should be at least 75 percent.

Suspended Sediment - Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

Sustained Yield - The yield that a forest can produce continuously at a given intensity of management.

Sustained Yield Unit - An administrative division of the EIS area for which an allowable cut is calculated.

Texture (soil) - The relative proportion of sand, silt and clay (expressed as percentages) in a soil; grouped into standard classes and subclasses in the USDA Soil Survey Manual.

Thermal Cover - Cover used by animals to ameliorate effects of weather. For elk, a stand of conifer trees which are at least 40 feet tall with an average crown closure of 70 percent or more. For deer, cover may include saplings, shrubs or trees at least 5 feet tall with 75 percent crown closure.

Tier - Using one document to provide necessary supporting information for another document in order to avoid repetition.

Tilth - The physical condition of soil relating to its ease of tillage, fitness as a seedbed and impedance to seedling emergence and root penetration.

Timberlands - See Forest Land.

Timber Production Base - Acres included in the calculation of the allowable cut (see Intensive and Constrained Timber Production Bases).

Timber Production Capability Classification (TPCC) - A classification system that identifies the commercial forest land base capable of producing timber on a sustained yield basis.

True Fir - A member of the genus Abies, e.g., white fir (Abies concolor). Douglas-fir (Pseudotsuga menziesii) is not a true fir.

Understory Species - Shade-tolerant plant species which characteristically grow beneath the forest canopy; e.g., blackberry and rhododendron.

Unit Resource Analysis (URA) - A BLM planning document which contains a comprehensive inventory and analysis of the resources within a specified geographic area and an analysis of their potential for development.

Visitor Day - Twelve visitor hours, which may be aggregated continuously, intermittently or simultaneously by one or more persons. Visitor days may occur either as recreation visitor days or as non-recreation visitor days.

Visual Resources - The land, water, vegetation, animals, structures and other features visible on public lands.

Visual Resource Management (VRM) - Planning, designing and implementing management activities on public lands in ways that will provide acceptable levels of visual impacts.

Visual Resource Management Classes - Numbers (I, II, III, or IV) assigned to public lands based upon scenic quality, sensitivity level and distance zone criteria. VRM classes provide objectives designed to mitigate and, in some situations, avoid adverse visual impacts. Class I (preservation) provides the highest level of protection for scenic values, and Class IV the lowest level.

Water Quality - The combined physical, chemical and biological characteristics of water bodies.

Watershed - The area drained by a given stream.

Wetland or Wetland Habitat - Permanently wet or intermittently flooded areas where the water table (fresh, saline, or brackish) is at, near, or above the soil surface for extended intervals, where hydric wet soil conditions are normally exhibited, and where depths generally do not exceed 2 meters. Vegetation is generally comprised of emergent water-loving forms (hydeophytes) which require at least a periodically saturated soil condition for growth and reproduction. In certain instances, vegetation may be completely lacking.

Withdrawals - BLM-administered lands which are not suitable or available for intensive timber management.

Yarding - The act or process of conveying logs to a landing.

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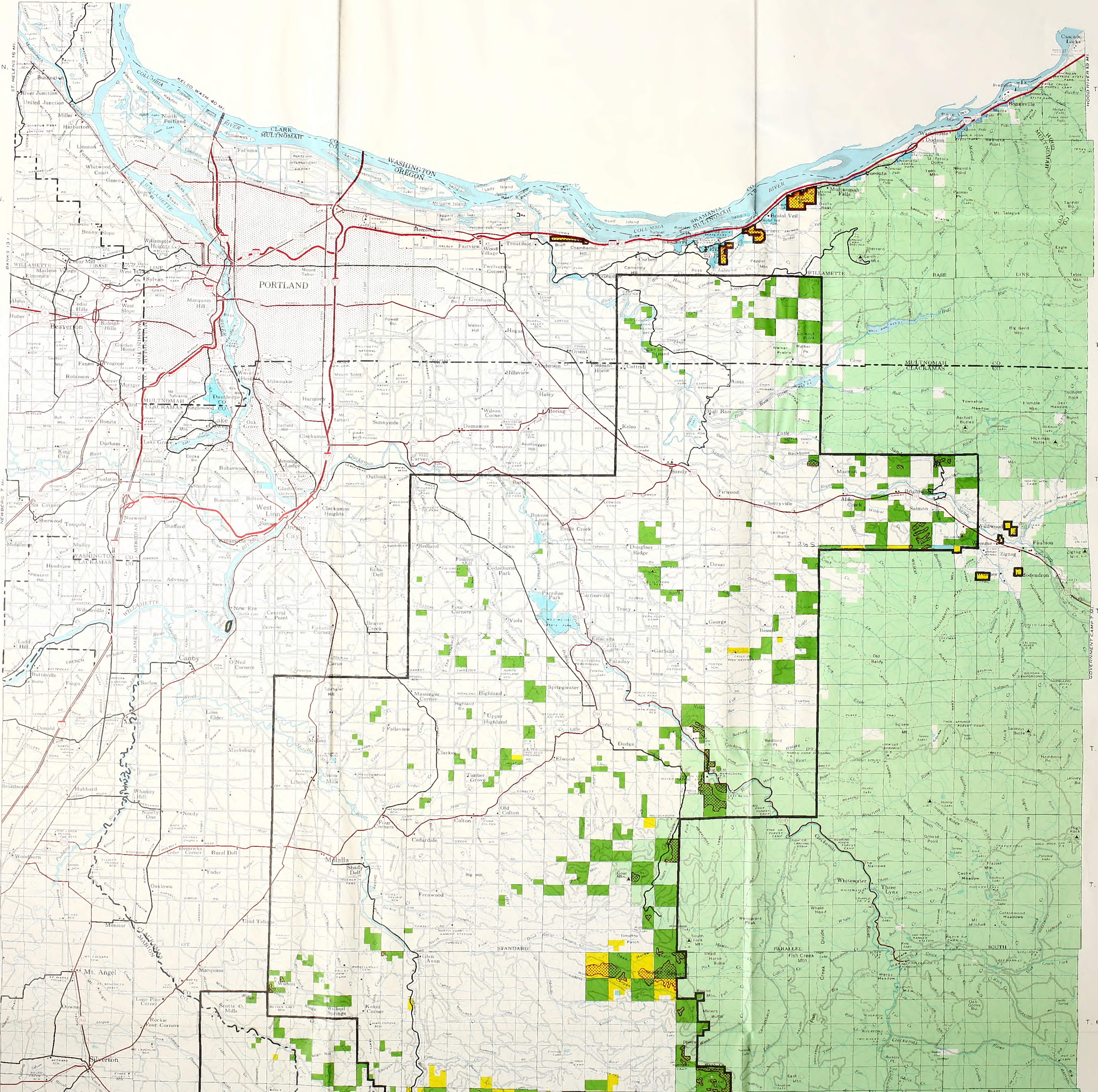
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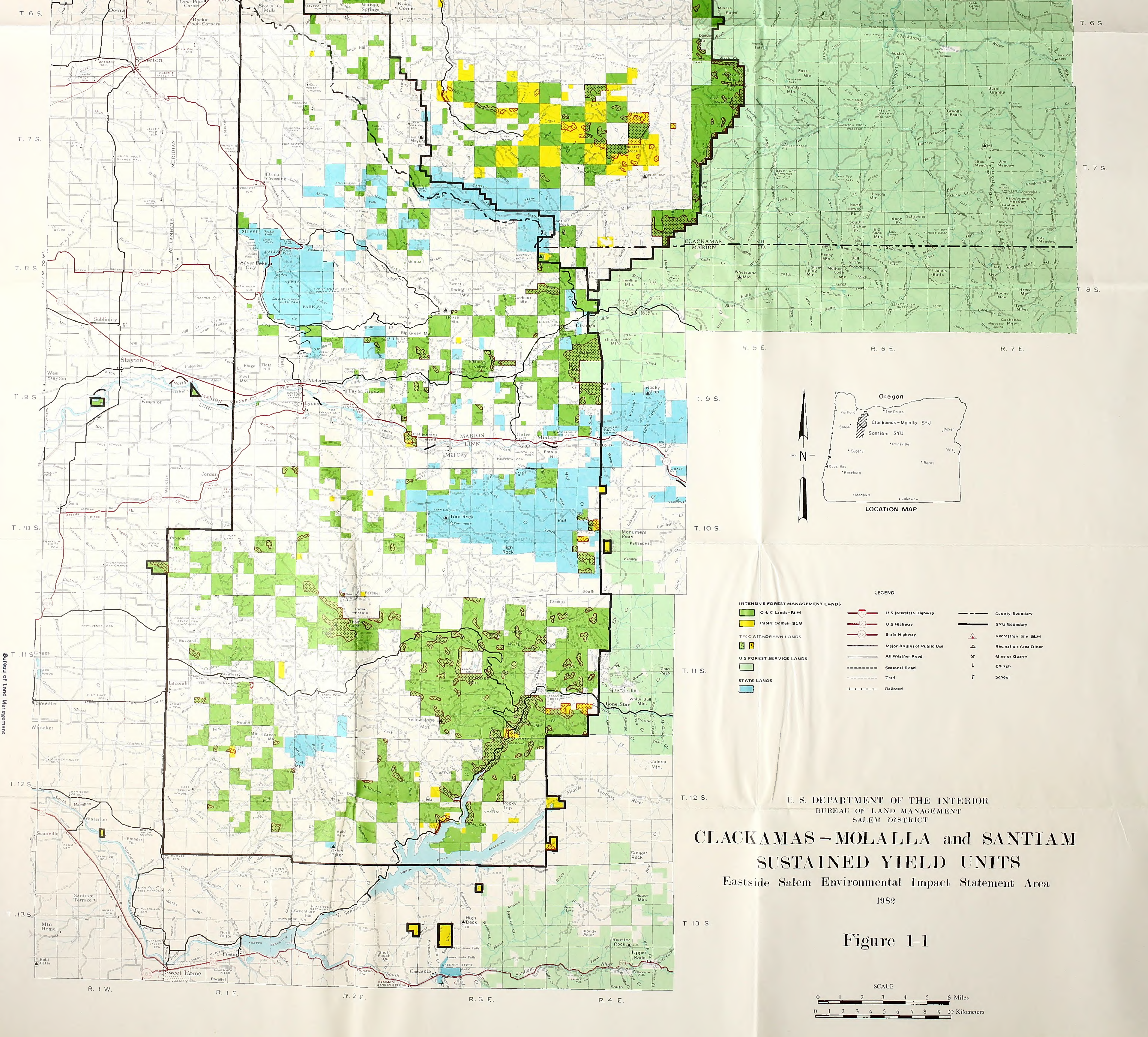
Woodburn
Monitor
Mt. Angel
Silverton
Molalla
Colton
Estacada
Sandy
Boring
Gresham
Troutdale
Fairview
Corbett
Multnomah Falls
Bonneville
Cascade Locks
Marmot
Brightwood
Welches
Zigzag
Rhododendron
Wemme
Faubion
Mulino
Liberal
Mt. Talapus
Larch Mtn.
Old Baldy
Squaw Mtn.
Whitewater
Three Lynx
Fish Creek Mtn.
Goat Mtn.
Timothy Patch
Glen Avon
Scotts Mills
Wilbur Springs
Dodge
Springwater
Highland
Carus
Beaver Creek
Redland
Viola
Eagle Creek
Cherryville
Firwood
Dover
George
Garfield
Bull Run
Aims
Kelso
Damascus
Clackamas
Carver
Happy Valley
Sunnyside
Pleasant Home
Cottrell
Orient
Hogan
Hillsview
Haley
Clackamas River
Sandy River
Bull Run River
Salmon River



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

CLACKAMAS – MOLALLA and SANTIAM SUSTAINED YIELD UNITS

Eastside Salem Environmental Impact Statement Area

1982

Figure 1-1

SCALE
0 1 2 3 4 5 6 Miles
0 1 2 3 4 5 6 7 8 9 10 Kilometers

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Old Growth 1-
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Particulates .....
Picnicking ......
Plant Diversity ..
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Preferred Alterna
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Research Natural
Revenues ....
Riparian Zones ..
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Scenic or Recr
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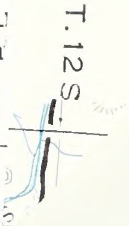

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Date Loaned	Borrower

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